जीवाणुओं की दुनिया और हम

विज्ञान संबंधित मूल्य

जिज्ञासा, ज्ञान-पिपासा, वस्तुनिष्ठता, ईमानदारी व सच्चाई, प्रश्न करने का साहस, क्रमबद्ध तर्क, प्रमाण/सत्यापन के पश्चात स्वीकृति, खुला दिमाग, पूर्णता प्राप्त करने की अभिलाषा तथा मिलजुल कर कार्य करने की भावना आदि विज्ञान संबंधी कुछ आधारभूत मूल्य हैं। इन मूल्यों द्वारा विज्ञान के उन प्रक्रमों को अभिलक्षणित किया जाता है, जो प्रकृति एवं उसकी अपघटनाओं से संबंधित सत्य के अन्वेषण में सहायता प्रदान करते हैं। विज्ञान का उद्देश्य विभिन्न वस्तुओं एवं अपघटनाओं की व्याख्या करना है। अतः विज्ञान सीखने एवं उसका अभ्यास करने के लिए –

* **अपने परिवेश की वस्तुओं तथा घटनाओं के प्रति जिज्ञासु बनें।**
* **प्रचलित विश्वासों एवं मान्यताओं पर प्रश्नचिह्न लगाने का साहस करें।**
* **"क्या", "कैसे" तथा "क्यों" में प्रश्न करें एवं सूक्ष्म प्रेक्षणों, प्रयोगों, परामर्शों, चर्चाओं व तर्कों द्वारा अपना उत्तर प्राप्त करें।**
* **प्रयोगशाला में अथवा उसके बाहर प्राप्त अपने प्रेक्षणों एवं प्रायोगिक परिणामों को सच्चाईपूर्वक लिखें।**
* **आवश्यकता पड़ने पर, प्रयोगों की पुनरावृत्ति सावधानीपूर्वक एवं क्रमबद्ध तरीके से करें, किन्तु किसी भी परिस्थिति में अपने परिणामों में हेरफेर न करें।**
* **तथ्यों, विचार-बुद्धि एवं तर्कों द्वारा अपना मार्गदर्शन करें, पूर्वाग्रहों से ग्रस्त न हों।**
* **अनवरत एवं समर्पित कार्य के द्वारा नई खोजों एवं नए आविष्कारों के लिए उत्कट अभिलाषा रखें।**

पढ़ें और सीखें योजना

जीवाणुओं की दुनिया और हम

दयाशंकर मिश्र

विभागीय सहयोग
रामदुलार शुक्ल

राष्ट्रीय शैक्षिक अनुसंधान और प्रशिक्षण परिषद्
NATIONAL COUNCIL OF EDUCATIONAL RESEARCH AND TRAINING

जनवरी 1993
माघ 1914
PD 10T – SD

प्रकाशन सहयोग

सी० एन० राव : अध्यक्ष, प्रकाशन विभाग

प्रभाकर द्विवेदी	मुख्य संपादक	**यू० प्रभाकर राव**	मुख्य उत्पादन अधिकारी
शर्मा दत्त	सहायक संपादक	**साईं प्रसाद**	उत्पादन अधिकारी
		विकास मेश्राम	सहायक उत्पादन अधिकारी
		राजेन्द्र चौहान	उत्पादन सहायक

एन.सी.ई.आर.टी. के प्रकाशन विभाग के कार्यालय

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श्री अरविंद मार्ग	चितलापक्कम, क्रोमपेट	डाकघर नवजीवन	32, बी.टी. रोड, सुखचर
नई दिल्ली 110016	मद्रास 600064	अहमदाबाद 380014	24 परगना 743179

आवरण : अमित श्रीवास्तव

मूल्य रु. 10.50

प्रकाशन विभाग में सचिव, राष्ट्रीय शैक्षिक अनुसंधान और प्रशिक्षण परिषद्, श्री अरविन्द मार्ग, नई दिल्ली 110016 द्वारा प्रकाशित तथा एडवांस टाइपसैटर्स (इंडिया), 730/8, रामकृष्णपुरम्, नई दिल्ली 110022, द्वारा लेजर टाइपसैट ~~होकर इण्डिया ऑफसेट प्रैस, ए-1, मायापुरी~~ इंडस्ट्रियल एरिया, नई दिल्ली 110064 में मुद्रित

प्राक्कथन

विद्यालय शिक्षा के सभी स्तरों के लिए अच्छे शिक्षाक्रम, पाठ्यक्रमों और पाठ्यपुस्तकों के निर्माण की दिशा में हमारी परिषद् पिछले पच्चीस वर्षों से भी अधिक समय से कार्य कर रही है। हमारे कार्य का प्रभाव भारत के सभी राज्यों और संघशासित प्रदेशों में प्रत्यक्ष और अप्रत्यक्ष रूप से पड़ा है और इस पर परिषद् के कार्यकर्ता संतोष का अनुभव कर सकते हैं।

हमने देखा है कि अच्छे पाठ्यक्रम और अच्छी पाठ्यपुस्तकों के बावजूद हमारे विद्यार्थियों की रुचि स्वतः पढ़ने की ओर अधिक नहीं बढ़ती। इसका एक मुख्य कारण अवश्य ही हमारी दूषित परीक्षा- प्रणाली है जिसमें पाठ्यपुस्तकों में दिए गए ज्ञान की ही परीक्षा ली जाती है। इस कारण बहुत ही कम विद्यालयों में कोर्स के बाहर की पुस्तकों को पढ़ने के लिए प्रोत्साहन दिया जाता है। अतिरिक्त पठन में बच्चों की रुचि न होने का एक बड़ा कारण यह भी है कि विभिन्न आयुवर्ग के बच्चों के लिए कम मूल्य की अच्छी पुस्तकें पर्याप्त मात्रा में उपलब्ध भी नहीं हैं। यद्यपि पिछले कुछ वर्षों में इस कमी को पूरा करने के लिए कुछ काम प्रारंभ हुआ है पर वह बहुत ही नाकाफी है।

इस दृष्टि से परिषद् ने बच्चों की पुस्तकों के लेखन की दिशा में एक महत्वाकांक्षी योजना प्रारंभ की है। इसके अंतर्गत पढ़ें और सीखें शीर्षक से एक पुस्तकमाला तैयार करने का विचार है जिसमें विभिन्न आयुवर्ग के बच्चों के लिए सरल भाषा और रोचक शैली में अनेक विषयों पर बड़ी संख्या में पुस्तकें तैयार की जाएंगी। हम आशा करते हैं कि बहुत शीघ्र ही हिंदी में हम निम्नलिखित विषयों पर 50 से भी अधिक पुस्तकें प्रकाशित कर सकेंगे।

(क) शिशुओं के लिए पुस्तकें
(ख) कथा- साहित्य
(ग) जीवनियां
(घ) देश- विदेश परिचय
(ङ) सांस्कृतिक विषय
(च) वैज्ञानिक विषय
(छ) सामाजिक विज्ञान के विषय

इन पुस्तकों के निर्माण में हम प्रसिद्ध लेखकों, वैज्ञानिकों, अनुभवी अध्यापकों और योग्य कलाकारों का सहयोग ले रहे हैं। प्रत्येक पुस्तक के प्रारूप पर भाषा, शैली और विषय- विवेचन की दृष्टि से सामूहिक विचार करके उसे अंतिम रूप दिया जाता है।

परिषद् इस माला की पुस्तकों को लागत- मूल्य पर ही प्रकाशित कर रही है ताकि ये देश के हर कोने में पहुँच सकें। भविष्य में इन पुस्तकों को अन्य भारतीय भाषाओं में अनुवाद कराने की भी योजना है।

हम आशा करते हैं कि शिक्षाक्रम, पाठ्यक्रम और पाठ्यपुस्तकों के क्षेत्र में किए गए कार्य की भाँति ही परिषद् की इस योजना का भी व्यापक स्वागत होगा।

प्रस्तुत पुस्तक *जीवाणुओं की दुनिया और हम* के लेखन के लिए प्रो० दयाशंकर मिश्र ने हमारा निमंत्रण स्वीकार किया जिसके लिए हम उनके अत्यंत आभारी हैं। जिन- जिन विद्वानों, अध्यापकों और कलाकारों से इस पुस्तक को अंतिम रूप देने में हमें सहयोग मिला है उनके प्रति मैं कृतज्ञता ज्ञापित करता हूँ।

हिंदी में पढ़ें और सीखें पुस्तक माला की यह योजना प्रो. अर्जुन देव के मार्ग- दर्शन में चल रही है। उनके सहयोगियों में श्रीमती संयुक्ता लूदरा, डा. रामजन्म शर्मा, डा. सुरेश पांडेय, डा. हीरालाल बाछोतिया और डा. अनिरुद्ध राय सक्रिय सहयोग दे रहे हैं।

इस योजना में विज्ञान की पुस्तकों के लेखन का मार्ग- दर्शन दिल्ली विश्वविद्यालय के भूतपूर्व कुलपति और राजस्थान विश्वविद्यालय में वर्तमान प्रोफेसर- एमेरिटस डा.

रामचरण मेहरोत्रा कर रहे हैं। विज्ञान की पुस्तकों के लेखन के संयोजन और अंतिम संपादन आदि का दायित्व हमारे विज्ञान एवं गणित शिक्षा विभाग के प्रो. राम दुलार शुक्ल वहन कर रहे हैं।

मैं डा. रामचरण मेहरोत्रा को और अपने सभी सहयोगियों को हार्दिक धन्यवाद और बधाई देता हूँ।

इन पुस्तकों को इतने अच्छे ढंग से प्रकाशित करने के लिए मैं परिषद् के प्रकाशन विभाग के कार्यकर्ताओं, विशेषकर विभागाध्यक्ष श्री सी. एन. राव और मुख्य संपादक श्री प्रभाकर द्विवेदी को हार्दिक धन्यवाद देता हूँ।

इस माला की पुस्तकों पर बच्चों, अध्यापकों और बच्चों के माता- पिता की प्रतिक्रिया का हम स्वागत करेंगे ताकि इन पुस्तकों को और भी उपयोगी बनाने में हमें सहयोग मिल सके।

के. गोपालन
निदेशक
राष्ट्रीय शैक्षिक अनुसंधान और प्रशिक्षण परिषद्

लेखक का संक्षिप्त परिचय

'जीवाणुओं की दुनिया और हम' के लेखक डा. दयाशंकर मिश्र विगत 30 वर्षों से जीवाणु- विज्ञान के प्राध्यापक के रूप में गोविंद बल्लभ कृषि एवं प्रौद्योगिक विश्वविद्यालय के पशु- चिकित्सा विज्ञान महाविद्यालय में कार्यरत रहे हैं। इन्होंने जीवाणु- विज्ञान के क्षेत्र में महत्वपूर्ण योगदान दिया है। दो वर्षों तक विदेश में प्राध्यापक जीवाणु विज्ञान के पद पर जैम्बिया विश्वविद्यालय में भी कार्य किया।

लेखक ने प्रस्तुत पुस्तक में जीवाणु- विज्ञान जैसे जटिल विषय को सरल बनाकर जनसाधारण की जानकारी के लिए रोचक ढंग से प्रस्तुत करने का प्रयास किया है। हम अपने दैनिक जीवन में प्रतिदिन सूक्ष्म- जीवाणु- जनित रोगों से ग्रसित होकर कष्ट पाते रहते हैं। लेखक ने अपनी इस पुस्तक में बहुत ही सरल भाषा के माध्यम से यह समझाने का प्रयास किया है कि हम इन जीवाणुओं द्वारा उत्पन्न रोगों से कैसे और क्यों ग्रसित होते रहते हैं, इनसे बचने तथा उपचार की क्या विधियाँ हैं, टीकों का इन जीवाणु जनित रोगों के बचाव में क्या महत्व है, इन रोगकारी जीवाणुओं को अपने दैनिक जीवन में नष्ट करके कैसे बच सकते हैं। अनुभवी लेखक ने इन जटिल प्रश्नों के उत्तर अपनी पुस्तक में सरल भाषा एवं रोचक ढंग से वर्णित किया है। इस पुस्तक के माध्यम से आप जीवाणुओं के विषय में एक परिचयात्मक जानकारी प्राप्त कर सकेंगे। डा. मिश्र आजकल एक अवकाशप्राप्त वैज्ञानिक के रूप में उपर्युक्त विश्वविद्यालय में कार्यरत हैं।

दो शब्द

राष्ट्रीय शैक्षिक अनुसंधान और प्रशिक्षण परिषद् (एन०सी०ई०आर०टी०) की "पढ़ें और सीखें" योजना के अंतर्गत यह एक छोटा-सा प्रयास है। जब परिषद् के प्रगतिशील निदेशक डा. के. गोपालन ने मुझे इस दिशा में विज्ञान के विषयों का कार्यभार संभालने के लिए आमंत्रित किया तो अपने वैज्ञानिक मित्रों की अतिव्यस्तता के कारण यह उत्तरदायित्व स्वीकार करने में मुझे संकोच था।

इस दिशा में मेरा प्रयास रहा है कि विज्ञान के विभिन्न विषयों के जाने- माने विद्वानों को इस सराहनीय कार्य के लिए निमंत्रित कर सकूँ। ऐसा मेरा विश्वास है कि खोज और अनुसंधान की आनंदपूर्ण अनुभूतियों वाले वैज्ञानिक ही अपने आनंद की एक झलक बच्चों तक पहुँचा सकते हैं। मैं उनका हृदय से आभारी हूँ कि उन्होंने अंकुरित होने वाली पीढ़ी के लिए अपने बहुमूल्य समय में से कुछ क्षण निकालने का प्रयास किया। बालक राष्ट्र की सबसे बहुमूल्य और महत्वपूर्ण निधि है और मेरे लिये यह किंचित आश्चर्य और संतोष की बात है कि हमारे इतने लब्धप्रतिष्ठ और अत्यंत व्यस्क वैज्ञानिक बच्चों के लिए थोड़ा परिश्रम करने के लिए सहर्ष मान गए हैं। मैं सभी वैज्ञानिक मित्रों के लिए हृदय से आभारी हूँ।

इन पुस्तकों की तैयारी में हमारा मुख्य ध्येय रहा है कि विषय ऐसी शैली में प्रस्तुत किया जाए कि बच्चे स्वयं इसकी ओर आकर्षित हों, साथ ही भाषा इतनी सरल हो कि बच्चों को इनके अध्ययन से विज्ञान के गूढ़तम रहस्यों को समझने में कोई कठिनाई न हो। इन पुस्तकों के पढ़ने से उनमें अधिक पढ़ने की रुचि पैदा हो, उनके नैसर्गिक कौतूहल में वृद्धि हो जिससे ऐसे कौतूहल और उसके समाधान के लिए स्वप्रयत्न उनके जीवन का एक अंग बन जाए।

यह योजना एन. सी. ई. आर. टी. के वर्तमान निदेशक डा. के. गोपालन की प्रेरणा से चल रही है। मैं उन्हें इसके लिए बधाई और धन्यवाद देता हूँ।

प्रो. दयाशंकर मिश्र ने इस पुस्तक के लिखने के लिए मेरा अनुरोध स्वीकार किया जिसके लिए मैं हृदय से आभारी हूँ। परिषद् के विज्ञान एवं गणित शिक्षा विभाग के प्रो. रामदुलार शुक्ल विज्ञान की पुस्तकों के लेखन से संबंधित योजना के संयोजक हैं और बहुत परिश्रम और कुशलता से अपना कार्य कर रहे हैं। प्रो. अर्जुन देव पढ़ें और सीखें संपूर्ण योजना के संचालक हैं। मैं इन दोनों को हृदय से धन्यवाद देता हूँ।

आशा है कि ऐसी पुस्तकों से हमारी नई पीढ़ी में बाल्यकाल ही में वैज्ञानिक मानसिकता का शुभारंभ हो सकेगा और विज्ञान के नवीनतम ज्ञान के साथ ही साथ उन्हें अपने देश की प्रगति एवं वैज्ञानिकों के कार्य की झलक मिल सकेगी जिससे उनमें अपने राष्ट्र के प्रति गौरव की भावना का भी सृजन होगा।

रामचरण मेहरोत्रा
अध्यक्ष
'पढ़ें और सीखें योजना'
(विज्ञान)

विषय-सूची

आवरण पारदर्शी

क्षयरोग उत्पन्न करने वाले माइको बैक्टीरियम ट्यूबरकुलोसिस का प्रतिदीप्त सूक्ष्म दर्शीय चित्र। संवेदी नर्वतंतु पर आक्रमण करके उसका विनाश करने वाले कुष्ठरोग के जीवाणु माइको बैक्टीरियम लेपरी।

— डा. रमा मुखर्जी, अध्यक्ष, माइक्रो बायोलोजी डिवीजन,

राष्ट्रीय प्रतिरक्षा संस्थान नई दिल्ली के सौजन्य से

गांधी जी का जन्तर

तुम्हें एक जन्तर देता हूं। जब भी तुम्हें सन्देह हो या तुम्हारा अहम् तुम पर हावी होने लगे, तो यह कसौटी आजमाओ :

जो सबसे गरीब और कमजोर आदमी तुमने देखा हो, उसकी शकल याद करो और अपने दिल से पूछो कि जो कदम उठाने का तुम विचार कर रहे हो, वह उस आदमी के लिए कितना उपयोगी होगा। क्या उससे उसे कुछ लाभ पहुंचेगा? क्या उससे वह अपने ही जीवन और भाग्य पर कुछ काबू रख सकेगा? यानि क्या उससे उन करोड़ों लोगों को स्वराज्य मिल सकेगा जिनके पेट भूखे हैं और आत्मा अतृप्त है?

तब तुम देखोगे कि तुम्हारा सन्देह मिट रहा है और अहम् समाप्त होता जा रहा है।

अध्याय 1

जीवाणुओं की दुनिया और हम – एक परिचय

जीवाणु (Bacteria) ऐसे सूक्ष्म जीवधारी हैं जिन्हें हम सामान्य आँखों से देखने में असमर्थ हैं। ये प्रकृति के अवयवों जैसे - जल, थल और वायु में, हमारे दैनिक जीवन में काम आने वाले खाद्य पदार्थों में जैसे मांस, मछली, अंडे, दूध तथा अन्य खाद्य पदार्थों में और शरीर में अन्दर बाहर सभी जगह उपस्थित हैं। इनकी सर्वत्रता का अनुमान इनकी सूक्ष्मता के कारण हम आसानी से नहीं लगा सकते। इनकी सूक्ष्मता का अनुमान इससे लग सकता है कि एक मिलीमीटर जगह में 1000 जीवाणु समा सकते हैं।

हमारे शरीर के अंदर जीवाणु बहुत से अंगो जैसे – फेफड़ों, अंतड़ियों, मुँह, नाक और त्वचा पर सामान्य दशा में हर समय मौजूद रहते हैं। अंतड़ियों में जीवाणु वृद्धि करते हैं तथा हमारे भोजन अवशेषों को पचाने में न केवल मदद करते हैं अपितु वे खुद ही पचकर हमारे शरीर के लिए कुछ बहुमूल्य विटामिनों के स्रोत भी बन जाते हैं। परन्तु यदि अंतड़ियों में रोग जनक जीवाणु पहुंच जायें तो अतिसार और आंत्रशोथ की दशा भी यही जीवाणु उत्पन्न कर देते हैं। हमारी त्वचा पर, हाथ की अंगुलियों पर बहुत अधिक संख्या में जीवाणु उपस्थित रहते हैं और हाथों को संदूषित बना देते हैं। इन्ही संदूषित हाथों को

यदि न धोया जाये और इनका उपयोग भोजन करने में किया जाए तो रोगजनक जीवाणु भोजन के साथ शरीर में प्रवेश पा जाते हैं और रोग उत्पन्न कर देते हैं। त्वचा यदि कहीं कट जाये तो त्वचा पर उपस्थित जीवाणु त्वचा में घुसकर घाव को पका देते हैं तथा घाव में पीव बनने लगता है जो कि बहुत ही कष्टकारी होता है।

हमारे चारों तरफ उपस्थित जीवाणु विपरीत परिस्थितियों में तथा शरीर की रोग- रोधक- क्षमता कम होने पर शरीर में तरह तरह के रोग उत्पन्न कर सकते हैं। संदूषित वायु में उपस्थित जीवाणु, मनुष्य में टी० बी०, इन्फ्लुएैंजा, मीजल आदि रोग उत्पन्न कर सकते हैं। संदूषित पानी से कालरा, आंत्रशोथ, पोलियो, जांडिस आदि रोग उत्पन्न हो सकते हैं। संदूषित खाद्य पदार्थों जैसे अण्डा, मांस, मछली, मिठाइयाँ, दूध आदि जिनमें जीवाणु उपस्थित रहते हैं , को खाने पर भोजन विषाक्तता हो सकती है और कालरा, आंत्रशोथ जैसे रोग उत्पन्न हो सकते हैं।

जीवाणु हमारे दैनिक जीवन में कई कार्यों में बहुत उपयोगी भी पाये गये हैं। हमारी अंतड़ियों में उपस्थित जीवाणु तरह तरह के बहुमूल्य विटामिन जैसे बी० काम्पलेक्स बनाते हैं जो कि हमें अनेक रोगों से बचा सकते हैं। इसी प्रकार कोलन में अवशेष भोजन के पचाने में जीवाणु महत्वपूर्ण योगदान देते हैं। प्रतिदिन काम आने वाले कुछ भोज्य पदार्थ जैसे दही, डबलरोटी, पनीर, सिरका आदि **"उपयोगी जीवाणुओं" की जटिल प्रक्रिया द्वारा ही बनाये जाते हैं।**

हमारे चारों तरफ बिखरे पड़े गंदे, सड़े, गले पदार्थों एवं मलमूत्र आदि को अहानिकारक बनाकर हमें स्वयं स्वस्थ रखने में जीवाणु महत्वपूर्ण भूमिका निभाते हैं। अगर स्वच्छता उत्पन्न करने वाले जीवाणु इस पृथ्वी पर न होते तो मानव चारों तरफ गंदगी के ढेरों से घिरा होता है।

इसी प्रकार जीवाणुओं से जीवन रक्षक दवायें "एंटीबायोटिक" जैसे पेनिसिलीन

स्ट्रेप्टोमाइसिन, टेरामाइसिन, क्लोरमफेनिकाल, आदि बनाये जाते हैं जिनकी सहायता से मानव ने बहुत से जीवाणुजनित रोगों जैसे – प्लेग, टी. बी. कॉलरा आदि से काफी हद तक मुक्ति पा ली है। हम भाग्यवान हैं कि जीवाणुजनित एंटीबायोटिक युग में पैदा होकर हमने अपने जीवनकाल की रेखा बढ़ा ली है।

जीवाणु कितने सूक्ष्म हैं इसका अनुमान हम इससे लगा सकते हैं कि एक सुई की नोक पर लगभग 500 जीवाणु समा सकते हैं। डच देश के एक चश्मे के व्यापारी एंटोनी- वान- लीवेनहाक ने पानी की एक बूंद में अपने द्वारा बनाये गये एक "सूक्ष्मदर्शी" से सन् 1683 में प्रथम बार इन सूक्ष्मजीवों को देखा। उसने इन्हें "एनिमलक्यूल" कहा और इनके विभिन्न रूपों का वर्णन किया। उसने इनको 300 गुना बड़ा करके भी देखा और इनके अनेक रूप जैसे दण्डाकार, गोलाकार तथा सर्पिल आदि आकार भी बताये। एंटोनी- वान- लीवेनहाक के सिद्धान्तों पर बनाये गये एक सामान्य और "आधुनिक सूक्ष्मदर्शी" से अब जीवाणुओं को 1000 से 2000 गुना बड़ा करके देखा जा सकता है। सूक्ष्मदर्शी का उपयोग अधिक सूक्ष्म जीवाणुओं के अध्ययन के लिए किया जाता है। "इलेक्ट्रान सूक्ष्मदर्शी" से तो जीवाणुओं को 200,000 गुना बड़ा करके देखा जा सकता है। विषाणु (Virus) तो जीवाणुओं से भी ज्यादा सूक्ष्म होते हैं और मनुष्यों में इन्फ्लुऐंजा, हिपेटाइटिस, पोलियो, "एड्स" नामक भयानक रोग उत्पन्न करते हैं। "एड्स" नामक रोग को तो इस पृथ्वी पर इस शताब्दी का मनुष्यों का एक बहुत ही घातक रोग माना जा रहा है। इसकी रोकथाम के लिए अभी तक न कोई टीका बन सका है और न ही कोई सक्षम उपचार ही निकला है।

जीवाणुओं द्वारा उत्पन्न रोगों की रोकथाम के लिए अब एंटीबायोटिक का प्रयोग बहुत सफलता से किया जा रहा है। गले की बीमारी तथा बच्चों में "न्यूमोनिया" का रोग जो कि "स्ट्रेप्टोकाई" नामक जीवाणुओं से होता है, का इलाज पेनिसिलिन नामक एंटीबायोटिक

से सफलतापूर्वक किया जा रहा है। इसी प्रकार टायफाइड और टी० बी० का उपचार "क्लोरमफेनिकाल एवं स्ट्रेप्टोमाइसिन" नामक एंटीबायोटिक से किया जाता है। परन्तु इन एंटीबायोटिक के लगातार प्रयोग से अब ऐसे जीवाणु उत्पन्न हो चुके हैं जिन पर अब उपयुक्त एंटीबायोटिक का प्रभाव प्रायः खत्म हो चुका है अर्थात् जीवाणु इस सामान्य रूप से प्रयुक्त होने वाले "एंटीबायोटिक" के प्रति अवरोधी बन चुके हैं। इस पर विजय प्राप्त करने के लिए अब हम दूसरे एंटीबायोटिक की खोज करने जा रहे हैं जिससे कि इन अवरोधी जीवाणुओं को शरीर के अंदर नष्ट किया जा सके। लेकिन एक समस्या इन सूक्ष्म जीवाणुओं के कारण मानव के सामने खड़ी हो गयी है और वह है कि शरीर में कुछ एंटीबायोटिक के प्रति एलर्जी उत्पन्न हो जाना। जीवाणुजनित इन समस्याओं को सुलझाने के लिए आज हम चिकित्सा विज्ञान की मदद से जूझ रहें हैं। इन सूक्ष्मजीवाणुओं का और हमारा युद्ध सदियों से जारी है और भविष्य में भी चलता रहेगा।

इस पुस्तक में उपयुक्त विषयों पर विस्तारपूर्वक प्रकाश डालने का प्रयास किया गया है जिससे आप इस विषय पर समुचित ज्ञान प्राप्त कर सकें और जीवन में जीवाणुओं की रोगकारक क्षमता के प्रति सजग बने रहें।

अध्याय 2

जीवाणुओं के रूप एवं उनकी रचना

जब हम खाना खाने जाते हैं तो हमारे बड़े बूढ़े कहते हैं,"हाथ धोकर खाना खाओ"। ऐसा क्यों ? हम अपने हाथों से तमाम ऐसी चीजों को छूते हैं जिन पर तरह तरह के जीवाणु लगे रहते हैं जो रोग भी उत्पन्न कर सकते हैं। धोने से जीवाणु हाथ से धुलकर बह जाते हैं और इस प्रकार हमारे शरीर में हाथ से भोजन में पहुँच कर रोग उत्पन्न करने वाले जीवाणुओं की संख्या कम हो जाती है।

इसी प्रकार आपरेशन के लिए जाने वाले डाक्टर के हाथ में दस्ताने, मुंह तथा सिर पर कपड़ा लगा रहता है क्यों ? जब डाक्टर आपरेशन द्वारा शरीर के अंगों को खोलता है तो रक्त और घाव में "पस" बनाने वाले जीवाणु हाथ के द्वारा, सांस के द्वारा और बालों के द्वारा पहुँच सकते हैं और घाव पक सकता है। आपरेशन वाले स्थान में "पस" पड़ने से रोगी की मृत्यु भी हो सकती है। इसलिए यह सब जीवाणुओं से बचने के लिए किया जाता है।

जीवाणु ऐसे सूक्ष्म जीव हैं जिन्हें हम नग्न आँखों से नहीं देख सकते। इनकी सूक्ष्मता ही इनकी सर्वत्रता का मुख्य कारण है। भार में यह इतने हल्के होते हैं कि हवा में बहुत दिनों तक तैरते रहते हैं और हवा के माध्यम से कहीं भी पहुँच सकते हैं। ऐसा अनुमान

है कि एक जीवाणु का भार लगभग 0.000,000,000,0002 ग्राम होता है और एक मिलीग्राम में लगभग 5 अरब (5×10^9) जीवाणु होते हैं। दूध की एक बूंद के अंदर पूरे दिल्ली शहर की आबादी से अधिक जीवाणु उपस्थित हो सकते हैं। अपनी इस सूक्ष्मता के कारण ही जीवाणु शरीर के किसी अंग में किसी भी जगह आसानी से पहुँच कर और अनुकूल परिस्थिति पाकर रोग उत्पन्न कर सकते हैं।

जैसा हम प्रथम अध्याय में बता आये हैं कि इन सूक्ष्म जीवाणुओं को देखने के लिए एंटोनी-वान-लीवेनहाक ने सूक्ष्मदर्शी यंत्र सन् 1683 में बनाया था। एंटोनी-वान-लीवेनहाक और अन्य लोगों के सिद्धांत पर बनाये गये अब एक आधुनिक सूक्ष्मदर्शी से जीवाणुओं को 1000 से 2000 गुना बड़ा करके देखा जा सकता है। एक अत्यंत आधुनिक इलेक्ट्रान सूक्ष्मदर्शी से तो जीवाणुओं को 200,000 गुना बड़ा करके देखा जा सकता है। इससे जीवाणु की जटिल आंतरिक रचना भी देखी जा सकती है।

जीवाणुओं के आकार तथा उनके माप : जीवाणुओं के आकार की सूक्ष्मता नापने के लिए जिस पैमाने का उपयोग किया जाता है वह भी अत्यंत सूक्ष्म होता है। दशमलव प्रणाली में बड़ी चीजों की लम्बाई, चौड़ाई नापने के लिए मीटर का प्रयोग होता है। परंतु जीवाणुओं की लम्बाई, चौड़ाई नापने के लिए जिस माप का प्रयोग किया जाता है उसे "माइक्रोमीटर" कहते हैं। एक माइक्रोमीटर (1µm) एक मीटर का एक लाखवाँ भाग (10^{-6} मीटर) होता है। इस "माइक्रोमीटर" को पहले "माइक्रान" (µ) भी कहा जाता था परन्तु अब इस नाम का उपयोग कम होता जा रहा है। जीवाणुओं से छोटे सूक्ष्मजीव जिन्हें "विषाणु" कहते हैं, की लम्बाई, चौड़ाई नापने के लिए हम एक और भी छोटे माप का प्रयोग करते हैं जिसे "नैनोमीटर" (nm) कहते हैं। पहले इसको "मिलीमाइक्रान" भी कहते थे। यह एक माइक्रोमीटर का हजारवाँ भाग है तथा मीटर का दस करोड़वाँ भाग (10^{-9}) है। जीवाणुओं एवं विषाणुओं की लम्बाई, चौड़ाई दर्शाने में इन्हीं दोनों सूक्ष्म मापों

का प्रयोग किया जाता है (चित्र 1) | विभिन्न जाति के जीवाणुओं के आकार अलग अलग होते हैं। स्टेफाइलोकोकाई और स्ट्रेप्टोकोकाई नामक जीवाणुओं का आकार छोटे छोटे गोले के रूप में होता है। इन गोलों का व्यास 0.75 से लेकर 1.25 माइक्रोमीटर तक होता है। टायफाइड तथा अतिसार रोग उत्पन्न करने वाले दंडाकार जीवाणु 0.5 माइक्रोमीटर से 1.0 माइक्रोमीटर चौड़े और 2-3 माइक्रोमीटर लम्बे होते हैं। मनुष्यों में सिफलिस रोग उत्पन्न करने वाले जीवाणु जिन्हें **ट्रिपेनिमा पेलेडियम** कहते हैं आकार में 0.3 माइक्रोमीटर चौड़े तथा 6 माइक्रोमीटर से 14 माइक्रोमीटर लम्बे होते हैं।

मिथेनोस्पीरिलियम अंगेरी नामक जीवाणु तो लम्बाई में 100 माइक्रोमीटर तक पाये जाते हैं। कोई कोई जीवाणु आकार में अत्यंत ही छोटे होते हैं; जैसे **माइकोप्लाज्मा** नामक जीवाणु तो आकार में केवल 0.1 माइक्रोमीटर से लेकर 0.3 माइक्रोमीटर तक पाये गये हैं।

चित्र 1.

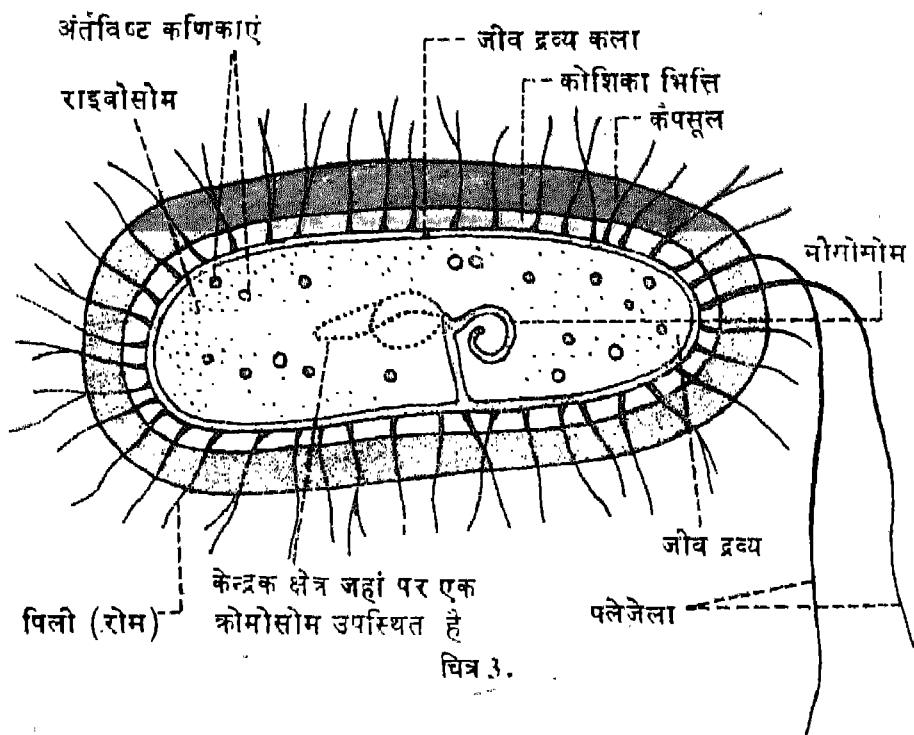
जीवाणुओं के रूप और रूप विन्यास : जीवाणु विभिन्न आकार, रूप एवं रूप विन्यासों में पाये जाते हैं। इनका रूप विन्यास कभी-कभी इनकी पहचान में अत्यंत सहायक होता है। जीवाणु मुख्यतः गोलाकार, दंडाकार और सर्पिल रूपों में पाये जाते हैं। गोलाकार जीवाणुओं के अंतर्गत इनके बहुत से रूप विन्यास देखे गये हैं (चित्र 2)। **डिप्लोकोक्कस न्यूमोनी** नामक जीवाणु गोलाकार होते हैं परन्तु ये दो-दो के समूहों में पाये जाते हैं और न्यूमोनिया का रोग मनुष्यों में उत्पन्न करते हैं। इसी प्रकार **स्ट्रेप्टोकोक्काई पायोजिनीज** नामक गोलाकार जीवाणु शृंखला में पाये जाते हैं तथा मनुष्यों में "रयूमेटिक फीवर" और "मेनिनजाइटिस" का रोग उत्पन्न करते हैं। अन्य जीवाणु जो गोलाकार हैं वे हैं **स्टेफाइलोकोक्कस आरियस** जो कि गुच्छों में पाये जाते हैं तथा मनुष्यों में "भोजन विषात्तता" उत्पन्न करते हैं। दूसरा है **निसीरिया गोनोरी** जो कि गोलाकार होते हैं और दो-दो के समूह में मिलते हैं और मनुष्यों के जनन अंगों में "गोनोरिया" जैसे भयानक रोग उत्पन्न हो सकते हैं। दंडाकार जीवाणुओं के अंतर्गत आते हैं – **इस्करीचिया कोलई** – ये जीवाणु दंडाकार और छोटे-छोटे होते हैं तथा हमारे अंदर "गैस्ट्रोइंटेराइटिस" (अतिसार) जैसे रोग उत्पन्न करते हैं। **साल्मोनिल्ला टायफोसा** नामक जीवाणु भी दंडाकार होते हैं तथा हमारे शरीर में "टायफाइड" जैसा भयानक रोग उत्पन्न करते हैं। तीसरा मुख्य दंडाकार जीवाणु है **कोरीनीबेक्टीरस डिप्फथीरिये** जो कि बच्चों में "डिप्फथीरिया" जैसा भयानक रोग उत्पन्न करता है। यह जीवाणु पतला होता है तथा इसके बदन पर सूक्ष्मदर्शी से 1500 गुना बड़ा करके देखने पर छोटे-छोटे दाने जैसे दिखाई पड़ते हैं। तृतीय रूप जीवाणुओं का कॉमा जैसा और सर्पिल आकार का होता है। इस समूह में **विबिरिओ कॉलरा** जो हैजा उत्पन्न करता है, से हम सभी परिचित हैं। यह सूक्ष्मदर्शी से देखने पर कॉमा जैसा दिखाई पड़ता है। इससे बिमारी होने पर उलटी और दस्त लग जाते हैं और यदि समय पर इलाज न किया जाए तो मृत्यु भी हो सकती है।

जीवाणुओं के रूप	रूप विन्यास	जीवाणुओं के नाम	जीवाणुओं से उत्पन्न होने वाले मनुष्यों के रोग
गोलाकार		डिप्लोकोक्कस न्यूमोनी (जीवाणु गोलाकार और दो के समूहों में चारों तरफ कैप्सूल)	निमोनिया और मेनिन्जाइटिस
		स्ट्रप्टो कोक्कस पायोजिनीज़ (जीवाणु गोलाकार और शृंखला में)	र्‍यूमैटिक फीवर (स्कारलेट फीवर)
		स्टेफाइलोकोक्कस आरियस (जीवाणु गोलाकार और गुच्छों में)	भोजन विषाक्तता आस्टीयोमाइलाइटिस
		निसीरिया गोनोरी (जीवाणु गोलाकार दो के समूह में)	गोनोरिया (जनन अंगों का रोग)
दंडाकार		इस्करीचिया कोलाई (दंडाकार, छोटे बड़े आकार में)	गेस्ट्रोइन्टेराइटिस (अतिसार)
		साल्मोनिल्ला टायफोसा (दंडाकार, छोटे बड़े आकार में)	टाइफाइड फीवर
		माइकोबैक्टीरियम टुबरकुलोसिस (दंडाकार, पतले गड्ढों में एकत्रित)	टुबरकुलोसिस
		कोरीनीबैक्टीरियम डिफ्थीरिये (दंडाकार, उनके शरीर पर छोटे दाने)	डिफ्थीरिया
कॉमा और सर्पिल आकार		विब्रिओ कालरा (दंडाकार परन्तु कॉमा आकार)	कॉलरा (हैजा)
		कैम्फाइलोबैक्टर जेजुनी (सर्पिल आकार)	गेस्ट्रोइन्टेराइटिस (अतिसार)
		ट्रिपोनीमा पैलिडम (सर्पिल आकार)	सिफलिस (जनन अंगों का रोग)

चित्र 2.

हाल ही में सर्पिल आकार के जीवाणु **कैम्फाइलोबैक्टर जेजुनी** की महत्ता सामने आयी है। यह जीवाणु सर्पिल आकार का होता है तथा मनुष्यों में अतिसार यानी गैस्ट्रोइंटेराइटिस उत्पन्न करने में सक्षम है। मनुष्यों में प्रजनन अंगों की बीमारियों में "सिफलिस" रोग काफी भयानक माना जाता है। इसको उत्पन्न करने वाला जीवाणु भी सर्पिल आकार का होता है। वैसे तो मनुष्यों में और भी रोग जीवाणुओं से होते हैं जैसे टी० बी० का रोग, **माइकोबैक्टीरियम ट्युबरकुलोसिस** के द्वारा होता है, तथा कोढ़ का रोग **माइकोबैक्टीरियम लेप्री** से होता है, जो **माइकोबैक्टीरिया ट्युबरकुलोसिस** की तरह ही होता है। ऐंथ्रेक्स का रोग **बैसिलस एंथ्रेसिस** से होता है। इसी प्रकार "टिटेनस" का रोग **क्लास्ट्रिडियम टेटेनाई** से होता है। ये चारों ही दंडाकार जीवाणु हैं परन्तु आपस में कई अन्य गुणों की भिन्नता से इनकी जातियां अलग हो जाती हैं।

जीवाणुओं की आन्तरिक रचना : एक जीवाणु की आंतरिक रचना क्या होती है यह जानने के लिए वैज्ञानिकों ने जीवाणु की आंतरिक रचना का सूक्ष्म विच्छेदन किया और उसकी अनिदैर्ध्य काटें (Longitudinal Sections) तैयार करके इलैक्ट्रान सूक्ष्मदर्शी द्वारा उसकी आंतरिक रचना का अध्ययन किया। चित्र 3 में एक दंडाकार जीवाणु की अनुदैर्ध्य काट का चित्र दिखाया गया है जिसमें उसकी आंतरिक रचना की झलक दिखाई पड़ रही है। जीवाणु का कोशिका- द्रव (Cell Cytoplasm) एक मजबूत कोशिका भित्ति (Cell Wall) से घिरा रहता है। कोशिका भित्ति ही जीवाणु को रूप प्रदान करती है तथा इसकी रचना ही जीवाणुओं के "ग्राम- अभिरंजन" (Gram Straining) गुण के लिए उत्तरदायी है। बहुत से जीवाणुओं में इस कोशिका भित्ति के ऊपर एक और रचना होती है जिसे "कैपसूल" कहते हैं। यह जीवाणु को मानव शरीर के अंदर श्वेत रक्त कणों के भक्षण की प्रक्रिया (Phagocytic Process) से बचाती है। कोशिका भित्ति पर जीवाणुओं को गतिशीलता प्रदान करने की एक रचना और भी होती है जिसे "फ्लेजेला" (कशाभिका)

कहते हैं। ये प्रोटीन के बने होते हैं इनकी संख्या जीवाणु को कम या अधिक गतिशीलता प्रदान करने के लिए कम या अधिक हो सकती है। **इस्कीरिचिया कोलाई** नामक जीवाणु की कोशिका भित्ति पर चारों तरफ फ्लेजेला होते हैं जिससे यह जीवाणु तरल माध्यम में बहुत ज्यादा गतिशील होता है। फ्लेजेला के अतिरिक्त जीवाणु की कोशिका भित्ति पर एक और रचना पाई जाती है जिसे "पिली (Pili)" रोम कहते हैं। ये रोम, फ्लेजेला से छोटे होते हैं और कोशिका भित्ति पर बहुत अधिक संख्या में होते हैं। ये भी प्रोटीन के बने होते हैं। ये जीवाणुओं के आसंजन (Adhesion) और प्रजनन में सहायक होते हैं। कोशिका भित्ति के अंदर की तरफ और जीव- द्रव के बाहर एक झिल्ली होती है जिसे जीव-द्रव

चित्र 3.

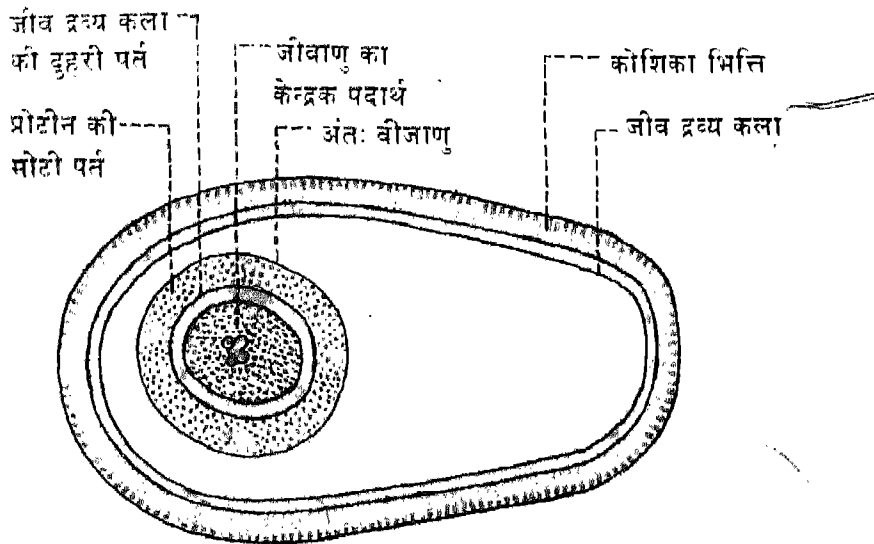
कला (Plasma Membrane) कहते हैं। यह जीवाणु के अंदर भोज्य- पदार्थ के प्रसरण में महत्वपूर्ण भूमिका निभाती है। यही झिल्ली जीव-द्रव के अंदर घुसकर वलय (Folds) बनाती है जिन्हें मीसोसोम (Mesosome) कहते हैं।

"मीसोसोम" जीवाणु- कोशिका के विभाजन के समय महत्वपूर्ण भूमिका निभाते हैं। जीव-द्रव के अंदर अन्य कोशिका की तरह जीवाणुओं में केन्द्रक नहीं होता बल्कि उसकी जगह "केन्द्रक- पदार्थ" एक छोटे से क्षेत्र में फैला रहता है जिसमें जीवाणुओं में उपस्थित एक पतला, गोल "क्रोमोसोम" जो कि डी० एन० ए० (डी आक्सी राइबोन्यूक्लीक अम्ल) का बना होता है, उपस्थित रहता है। इसी को जीवाणु का गुणसूत्र (Chromosome) कहते हैं। इसमें जीवाणु के प्रजनन सम्बन्धी गुण एवं अन्य गुण मौजूद रहते हैं। जीवाणु गुणसूत्र के अतिरिक्त जीवाणु के कोशिका द्रव में कुछ अन्य गोले छोटे गुणसूत्र, जो कि डी० एन० ए० के बने होते हैं, उपस्थित होते हैं जिन्हें "प्लाजमिड" (Plasmids) कहते हैं। यह जीवाणु- गुणसूत्र से भिन्न होते हैं और उसके कार्य कलाप में कोई बाधा उत्पन्न नहीं करते हैं। ये "प्लाजमिड" कुछ विपरीत परिस्थितियों में जीवाणु के "कोशिक द्रव" में उपस्थित हो जाते हैं। ये जीवाणु को विपरीत परिस्थिति से लड़ने की क्षमता प्रदान करते हैं। इसके अतिरिक्त कोशिका द्रव में राइबोसोम और अंतर्विष्ट कणिकाएं (Inclusion Particles) उपस्थित रहते हैं। राइबोसोम, जीवद्रव (Cytoplasm) के अंदर प्रोटीन संश्लेषण में सहायक होते हैं तथा अंतर्विष्ट कणिकाएं जीवाणु के लिए भोजन पदार्थ संग्रहित करने में सहायक होती हैं।

जीवाणुओं में बीजाणु (Spore) बनना

ऐसा देखा गया है कि प्रतिकूल वातावरण में जीवाणु अपनी जीवनरक्षा के लिए अपने अंदर "बीजाणु" बना लेते हैं जिन्हें इंडोस्पर (अंतः बीजाणु) कहते हैं। जब जीवाणु के अंदर कुछ आवश्यक पदार्थों की कमी होने लगती है तभी जीवाणुओं में अंतः बीजाणु

बनते हैं। यह गुण कुछ विशेष जाति के जीवाणुओं जैसे "क्लास्ट्रियम" और "बैसिलस" में ही देखा गया है। ये अंतः बीजाणु जीवाणु की वह अवस्था है जिसके कारण जीवाणु पानी एवं खाद्य पदार्थों की विपरीत अवस्था में भी वर्षों तक जीवित रह सकते हैं। "बैसिलस" जीवाणु का "अंतः बीजाणु" तो 100 वर्ष तक जीवित पाया गया है।

"स्पोर" बनते समय जीवाणु का केन्द्रक पदार्थ तथा कुछ अन्य छोटे अणु जीवद्रव कला की दो पर्तों तथा उस पर मोटी प्रोटीन की सतह से घिर जाते हैं और अंतः बीजाणु बनाते हैं (चित्र 3 अ) अनुकूल परिस्थिति पाते ही ये अंतः बीजाणु वृद्धि करके फिर जीवाणु कोशिका बना देते हैं। जीवाणु के अंतः बीजाणु अपनी विशेष संरचना के कारण उबालने पर भी नष्ट नहीं होते तथा इनके ऊपर सामान्य जीवाणु हनन क्रियाओं का कोई प्रभाव नहीं पड़ता। इन्हीं अवरोधी अंतः बीजाणु के कारण जीवाणु को रोग फैलाने में भी बहुत सहायता मिलती है।

चित्र 3. अ

अध्याय 3

जीवाणु-जनित रोग क्यों और कैसे ?

जीवाणुओं का रूप क्या है ? यह हम पिछले अध्याय में जान चुके हैं। इस अध्याय में हम यह बताने का प्रयास करेंगे कि किन-किन परिस्थितियों में जीवाणु शरीर में रोग उत्पन्न करने में समर्थ हैं। हमारे शरीर की प्रतिरक्षा प्रणाली एवं जीवाणुओं की रोगजनक क्षमता में एक प्रकार का संतुलन बना रहता है। जैसे ही यह संतुलन बिगड़ता है जीवाणु हम पर भारी पड़ जाते हैं और हम रोग से पीड़ित हो जाते हैं। जरा सा हमारा शरीर कहीं कट जाये और उसका हम उपचार न करें तो दूसरे ही दिन उसमें दर्द होने लगता है तथा उसमें पीब पड़ती दिखाई देती है। आखिर ऐसा क्यों होता है ? हमारे शरीर की त्वचा पर रहने वाले **स्टेफालोकोकाई** नामक जीवाणु कटी हुई जगह में घुस जाते हैं और श्वेत रक्त कणिकाओं को मारकर उनको पीब या पस में बदल देते हैं। जीवाणुओं द्वारा रोग उत्पन्न करने की इस क्षमता के कारण ही ऐसा होता है।

रोगजनकता संक्रमण और रोग : संक्रमण और रोग (Infection and Disease) आपस में एक दूसरे के लिए प्रयुक्त होते हैं परन्तु इनके अर्थ में अन्तर है। संक्रमण से तात्पर्य है कि रोग- जनक जीवाणु का परपोषी (Host) के शरीर में प्रवेश पा लेना तथा

वहाँ पर बस जाना। परन्तु रोग उत्पन्न होना तभी कहा जा सकता है जबकि जीवाणु शरीर की प्रतिरक्षा प्रणाली पर विजय प्राप्त करके रोग के लक्षण उत्पन्न कर दे। अतः संक्रमण केवल जीवाणु की उपस्थिति बताता है न कि रोग का होना।

स्वस्थ शरीर में सामान्य रूप से उपस्थित रहने वाले जीवाणु : जब शिशु मां के पेट में रहता है तब उसमें कोई जीवाणु नहीं होता परन्तु पैदा होने के साथ ही उसके शरीर में जीवाणुओं का प्रवेश प्रारम्भ हो जाता है। जन्म के समय नवजात शिशु मां की योनि से "लैक्टोबेसिलस" जीवाणु को ग्रहण करता है और उसकी अंतड़ियों में ये जीवाणु जन्म के बाद बहुत अधिक संख्या में पाये जाते हैं। उसके उपरांत भोज्य पदार्थों से जैसे दूध और दूध उत्पाद तथा मानव संसर्ग से विभिन्न प्रकार के जीवाणुओं की संख्या शिशु में बढ़ती जाती है। इस प्रकार शिशु के शरीर की बाह्य त्वचा तथा आंतरिक अंगों में जीवाणु की उपस्थिति हो जाती है। इसमें से तो कुछ स्वस्थ शरीर में सामान्य रूप से बने रहते हैं और कुछ, कुछ समय के लिए संख्या में बढ़ जाते हैं और फिर घटकर धीरे- धीरे बिल्कुल समाप्त हो जाते हैं। शरीर में सामान्य रूप से रहने वाले जीवाणु हर अंग में नहीं रहते, बल्कि शरीर के कुछ विशिष्ट स्थानों एवं अंगों पर बसेरा डाले रहते हैं (जैसा कि चित्र 4 में दर्शाया गया है)। मानव- स्वस्थ शरीर में सामान्य रूप से रहने वाले जीवाणुओं का मानव से संबंध सह- अस्तित्व का है – जीवित रहो और जीवित रहने दो। इसी को सहजीवन (Symbiosis) कहते हैं। इसी सहजीवन का एक प्रकार "सहभोजिता" (Commensalism) है।

इसमें बसे हुए जीवाणु परपोषी से उत्सर्जित पदार्थों को भोजन के रूप में ग्रहण करते हैं और परपोषी को न कोई लाभ पहुंचाते हैं न ही कोई हानि। जैसे **कोरीनोबैक्टीरियम** नामक जीवाणु आंखों में रहते हैं। आंखों से उत्सर्जित होने वाला मल पदार्थ उनका भोजन है। परन्तु ये वहां रहकर आंख को कोई हानि नहीं पहुंचाते। इसी सहजीवन का एक रूप

आंख
स्टेफाइलोकोक्कस एपिडरमिडिस
स्टेफाइलोकोक्कस आरियस
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डिप्फथेरायड्स
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बेसिलाई
त्वचा
स्टेफाइलोकोक्कस एपिडरमिस
स्टेफाइलोकोक्कस आरियस
प्रोपिनाबेक्टीरियम एक्नीस
कोरानी बेक्टीरियम जीरोसिस
बड़ी आंत
लेक्टोबेसिलस
बेक्टीरायड
ई. कोलाई
इंटरोबेक्टर
इंटरोकोक्काई
क्लेबसिएल्ला
प्रोटीयस
फ्यूजोबैक्टीरियम
क्लास्ट्रीडियम
केंडिडा
गला
स्ट्रेप्टोकोक्काई न्यूमोनी
हिमोफिलस इन्फ्लुएन्जी
निसेरिया मेनेन्जाइटिस
मुंह
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निसीरिया
वीलोनिला
मूत्र एंव जनन अंग
स्ट्रेप्टोकोक्कस
लेक्टोबेसिलस
बेक्टीरायड
क्लासट्रिडयम
स्ट्रेफाइलोकोक्कस
डिप्फीथीरायड
केंडिडा
ट्राइकोमोनास

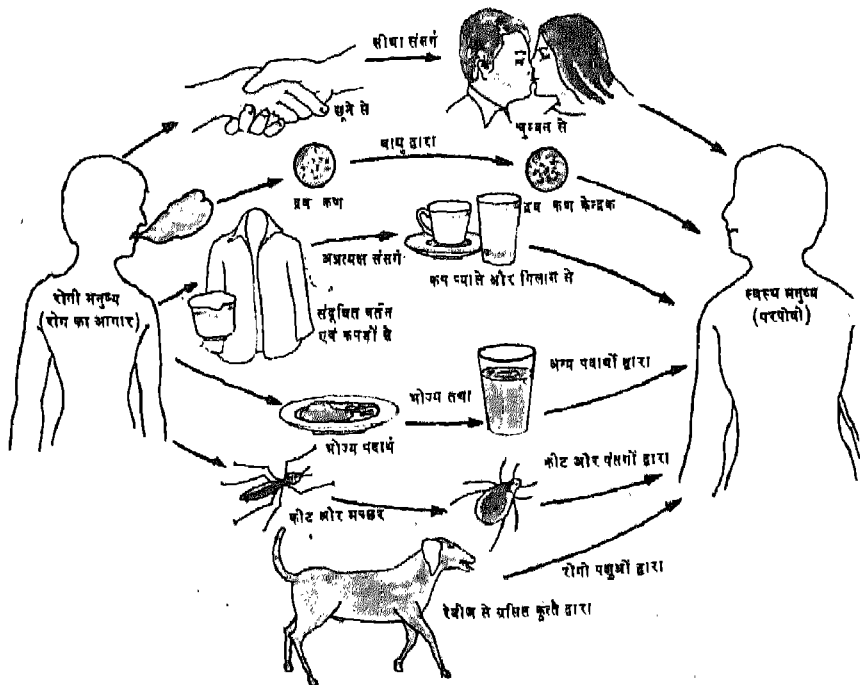
चित्र 4.

सहोपकारिता (Mutualism) भी है जो बड़ी आंत में रहने वाले जीवाणुओं में पाई जाती है। बड़ी आंत में रहने वाले जीवाणु **ई० कोलाई** विटामिन "के" और विटामिन "बी" का संश्लेषण करते हैं। ये विटामिन रक्त द्वारा अवशोषित होकर शरीर के अन्य भाग में कोशिकाओं के उपयोग के लिए चले जाते हैं। इसके बदले में, बड़ी आंत में उपस्थित भोजन के अवशेषों पर ये जीवाणु अपना जीवन गुजारते हैं तथा भोजन पाचन में सहायता भी करते हैं। परन्तु किन्हीं बदली हुई परिस्थितियों में ये नुक्सान न पहुंचाने वाले जीवाणु भी रोगजनक बन जाते हैं। बड़ी आंत में रहने वाले **ई० कोलाई** एक अवसरवादी (Opportunist) जीवाणु हैं। जब तक यह बड़ी आंत में है सामान्य रहता है परन्तु यदि शरीर की प्रतिरक्षा प्रणाली में कोई कमी आ जाये और यह छोटी आंत में पहुंच जाए तो, अतिसार और **इन्टेराइटिस** उत्पन्न कर देता है। यही नहीं, यदि ये जीवाणु बड़ी आंत की श्लेष्मिक झिल्ली पार कर लें तो अन्य अंगों जैसे मूत्रथैली, फेफड़े, गुर्दे, सुषुम्ना आदि में पहुंच कर तरह-तरह के रोग भी उत्पन्न कर देते हैं। इसी प्रकार त्वचा पर रहने वाला **स्टेफाइलोकोकाई** किसी प्रकार का नुक्सान नहीं पहुंचाता परन्तु यदि त्वचा कहीं कट जाये अथवा चोट लगने से कोई घाव बन जाये, तो यही **स्टेफाइलोकोकाई** चोट तथा कटे हुए स्थान पर घुसकर पीब बनाने लगते हैं।

रोग का फैलाव : सामान्य रूप से रहने वाले जीवाणुओं के अतिरिक्त यदि बाहर से अधिक संख्या में रोगजनित जीवाणु शरीर में प्रवेश पा जायें तो शरीर की प्रतिरक्षा प्रणाली का संतुलन बिगड़ जाता है तथा शरीर में रोग उत्पन्न हो जाता है। रोग जनक जीवाणुओं के शरीर में पहुंचने के कई रास्ते और माध्यम हैं।

(1) **संसर्ग द्वारा :** यह भी दो प्रकार का होता है (अ) सीधा (Direct) या प्रत्यक्ष संसर्ग तथा (ब) अप्रत्यक्ष (Indirect) संसर्ग। सीधे संसर्ग में रोगजनक जीवाणु का परपोषी से सीधा सम्पर्क होता है जैसे कि किसी रोगी का स्वस्थ मनुष्य को छूना या

हाथ मिलाना, रोगी का चुम्बन लेना, रोगी पुरुष या स्त्री का स्वस्थ स्त्री या पुरुष से संभोग करना। इस तरह से फैलने वाले रोगों के नाम हैं – सिफलिस, गोनौरिया, एड्स, रेबीज, मीज़ल, स्कार्लेट फीवर आदि।

अप्रत्यक्ष रूप से संसर्ग किसी अजीवित पदार्थ जो कि संदूषित हो, के माध्यम से होता है, जैसे संदूषित रूमाल, तौलिया, बिस्तर, बर्तन, प्याले आदि। ऐसे संदूषित पदार्थ रोगजनक जीवाणुओं को परपोषी तक पहुंचाते हैं। संदूषित तौलियों के प्रयोग से **स्टेफाइलोकोक्कस** का फैलाव अक्सर देखा गया है (चित्र 5)।

चित्र 5.

(2) **वायु द्वारा :** जब हम बोलते, खांसते या छींकते हैं तो हमारे मुंह व नाक से छोटे छोटे द्रव कण (Droplets) वायु में बिखर जाते हैं और एक मीटर तक हवा में तैरते हुए चले जाते हैं और परपोषी को संक्रमित कर देते हैं। कभी-कभी यह द्रव कण सूखकर द्रव- कण- केन्द्रक (Droplet Nuclei) बन जाते हैं जो कि काफी समय तक हवा में बने रहते हैं तथा स्वस्थ परपोषी में संदूषण उत्पन्न करते रहते हैं। रोगी मनुष्य के नाक व मुंह से निकले संदूषित- द्रव कण रोग को स्वस्थ परपोषी तक पहुंचाने की बहुत ही महत्वपूर्ण भूमिका निभाते हैं (चित्र 5)। इस विधि से फैलने वाले कुछ रोगों के नाम हैं – टुबरकुलोसिस, क्यू फीवर, माता (चेचक) का रोग, फफूंद से होने वाले रोग आदि।

(3) **भोज्य तथा अन्य पदार्थों द्वारा :** इस विधि में अजीवित भोज्य पदार्थ या अन्य पदार्थ रोगाणु को स्वस्थ परपोषी तक पहुंचाने में सहायता करते हैं। इसके अंतर्गत आते हैं – संदूषित भोज्य पदार्थ, पानी, दूध, फल आदि। इस विधि से फैलने वाले कुछ रोग हैं – कॉलरा, हिपेटाइटिस, टायफाइड, भोजन विषाक्तता आदि। अन्य पदार्थों के उदाहरण हैं रक्ताधान (Blood Transfusion)। एड्स नामक रोग तो मुख्यतः बीमार मनुष्य के रक्त को स्वस्थ मनुष्य में आधान करने से होता है।

(4) **कीट पतंगों द्वारा :** छोटे-छोटे कीट जैसे मच्छर, मक्खी, पिस्सू, किलनी, जूँ आदि रोग- वहन में महत्वपूर्ण भूमिका निभाते हैं। ये रोग- वहन में दो प्रकार से मदद करते हैं। पहली विधि में इनकी भूमिका यांत्रिक होती है। जैसे मक्खी, रोगी मनुष्य के मलमूत्र और अन्य संदूषित उत्सर्जी पदार्थ पर बैठकर अपने पैरों को रोगाणुओं से संदूषित कर लेती है। फिर यही मक्खी जब स्वच्छ भोज्य पदार्थों पर बैठती है तो अपने पैरों में लगे रोगाणुओं को भोजन पर पहुंचा कर भोजन को संदूषित कर देती है। इस विधि से मुख्यतः दो रोग फैलते हैं – एक तो "टायफाइड" दूसरा

"शिगीलोसिस" जिसमें खूनी आंव पड़ने लगता है । दूसरी रोग- वहन विधि में रोगाणु कीट के अंगों में वृद्धि करते हैं । जब ये कीट किसी स्वस्थ मनुष्य को खून पीने के लिए काटते हैं तो ये रोगाणुओं को स्वस्थ मनुष्य के शरीर में पहुंचा देते हैं। इसका एक अच्छा उदाहरण है मलेरिया । इसी विधि से फाइलेरिया का रोग भी मनुष्यों को लगता है ।

(5) **रोगी जानवरों द्वारा :** कुत्ते, बिल्ली तथा अन्य पालतू पशु भी तरह तरह के बिमारियों से पीड़ित होते रहते हैं । इनके रोगाणु भी संसर्ग या काटने से मनुष्यों को लग सकते हैं । इसका उदाहरण है रेबीज, जो कि कुत्ते की एक भयानक बीमारी है । इसमें कुत्ता पागल हो जाता है और ऐसा पागल कुत्ता यदि मनुष्य को काट ले तो मनुष्य भी पागल हो जाता है । एक बार यदि किसी मनुष्य में रेबीज के लक्षण दिखाई दें तो फिर उसकी मृत्यु निश्चित है । इसके लिए यह जरूरी है कि कुत्ते के काटने के तुरन्त बाद 14 इंजेक्शन लगवा लेना चाहिए । इसी से मनुष्य के जीवन की रक्षा हो सकती है ।

शरीर में जीवाणुओं द्वारा रोग कैसे उत्पन्न होता है ? इसको समझने के लिए संक्षेप में पहले जीवाणु की रोग उत्पन्न करने की क्षमता (Pathogenieity) तथा जीवाणु द्वारा उत्सर्जित कुछ विषैले पदार्थों एवं परपोषी की रोगरोधक क्षमता के विषय में कुछ समझ लें। इन सबके विषय में लिखने से पहले एक उदाहरण दिया जा सकता है जिससे उपर्युक्त विषय को समझने में आसानी होगी । अगर डाकू पिस्तौल और मशीनगन लेकर किसी बैंक में डाका डालने घुसें तो बैंक के सुरक्षा कर्मचारी क्या करेंगे ? अगर डाकू कम हैं और सुरक्षाकर्मचारी के पास अच्छे हथियार हैं तो वे डटकर मुकाबला करेंगे । सुरक्षा कर्मचारी या तो उन्हें मार देंगे या फिर डाकू थोड़ा ही नुक्सान करके भाग निकलेंगे । इसके विपरीत यदि डाकू ज्यादा हों और अधिक अच्छे शस्त्रों जैसे पिस्तौलों और स्टेनगनों से सुसज्जित

जीवाणु जब परपोषी तक पहुंच जाय
परपोषी
जीवाणु
श्वेत रक्त कणिकायें
अ
स्वस्थ मनुष्य में जब जीवाणु रोग उत्पन्न करने में असमर्थ
कोशिका का पादाभ
जीवाणु
जीवाणु का श्वेत रक्त कणिका से आसजन
फैगोसोम
जीवाणु फैगोसोम के अंदर
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फैगोसोम में लाइसोम का विलय। श्वेत रक्त कणिका के अंदर जीवाणु भक्षण
जीवाणु का फैगोलाइसोम के अंदर विघटन
रक्त कणिका का केन्द्रक
ब
जब जीवाणु परपोषी में रोग उत्पन्न करने में समर्थ
जीवाणु
श्वेत रक्त कणिका
जीवाणुओं द्वारा उत्पादित जीव-विष
श्वेत रक्त कणिका का केन्द्रक
जीवाणुओं एवं उनसे उत्पादित जीव विष के कारण एक नष्ट होती श्वेत रक्त कणिका
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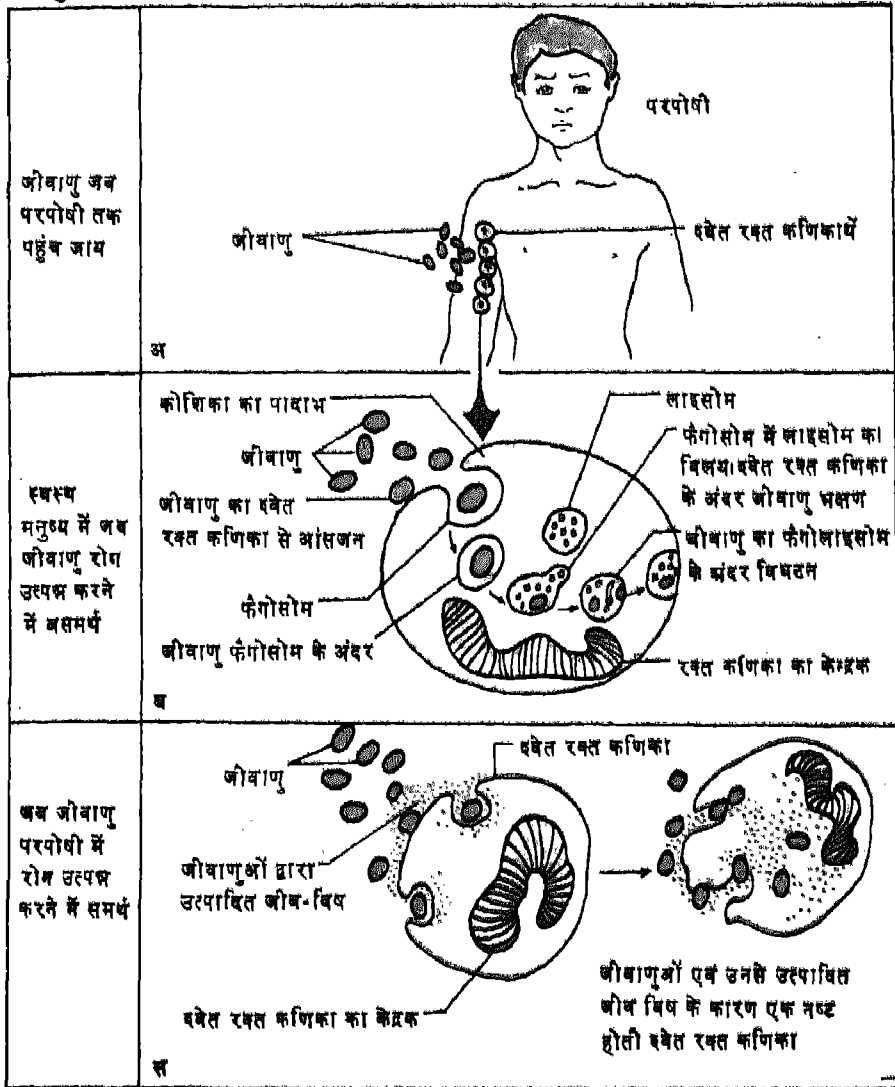
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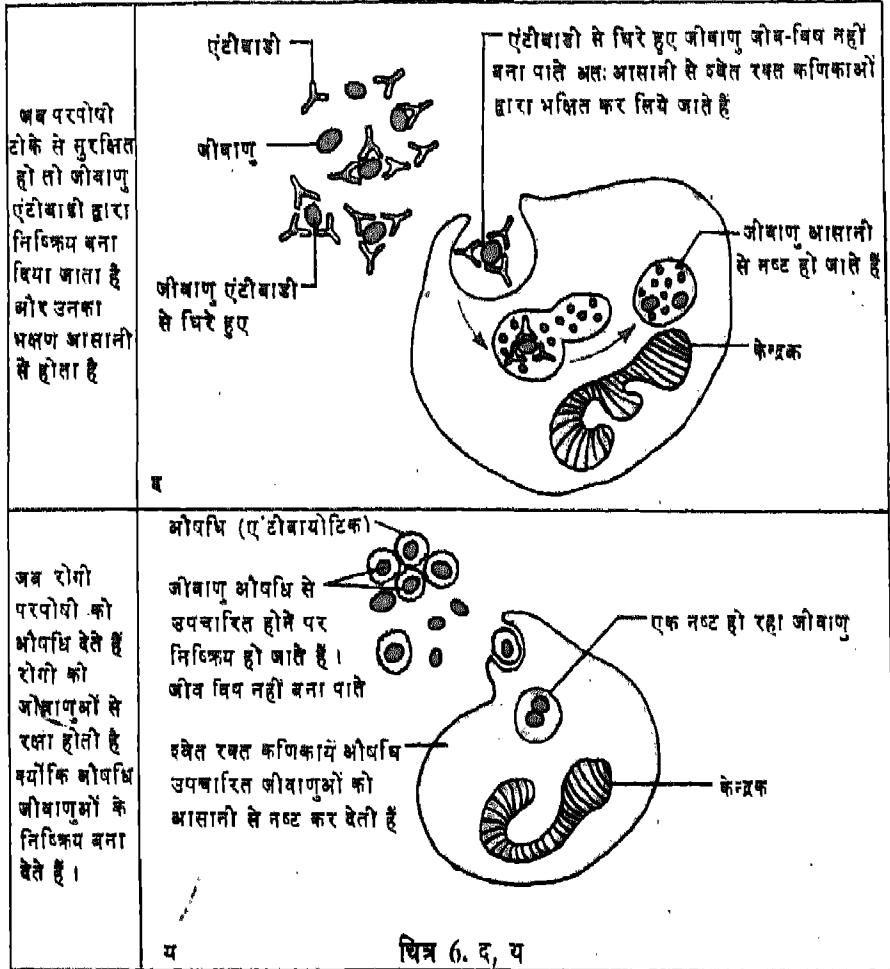
हों, तो बैंक के सुरक्षा कर्मचारी कमज़ोर पड़ जायेंगे तथा उनकी अवरोध करने की क्षमता क्षीण पड़ जायेगी और डाकू उन पर विजय प्राप्त कर बैंक लूट लेंगे। एक और स्थिति में यदि सुरक्षा कर्मचारियों को कोई और बाहरी सहायता मिल जाये तो डाकू भी मारे जायेंगे और बैंक भी लुटने से बच जायेगा।

कुछ-कुछ ऐसा ही हमारे शरीर में भी होता है। रोगजनक जीवाणु हमारे बैंक रूपी शरीर में डाकुओं की तरह घुस जाते हैं (संदूषित भोजन एवं पानी द्वारा, संसर्ग के माध्यम से या कीट पतंगों के द्वारा काटने से ऐसा होता है)। उनके शरीर में घुसते ही हमारे शरीर में उपस्थित श्वेत- रक्त कणिकाएं (जो कि बैंक के सुरक्षा कर्मचारियों की तरह हैं) जीवाणुओं को चारों तरफ से घेर लेती हैं (चित्र 6 अ) और उनका भक्षण (Phagocytosis) करने का प्रयास करती हैं। अगर जीवाणु संख्या में कम हुए तथा उनके पास मौजूद अस्त्र- शस्त्र (विषैले पदार्थ) यदि श्वेत कणिकाओं को मारने में असमर्थ हुए तो ये जीवाणु हमारे शरीर की श्वेत-रक्त कणिकाओं के भक्षण प्रक्रिया द्वारा नष्ट कर दिये जायेंगे (चित्र 6 ब) और वे शरीर में रोग उत्पन्न करने में समर्थ नहीं होंगे (अर्थात् शरीर रूपी बैंक को नहीं लूट पायेंगे)।

इसके विपरीत यदि घुसे हुए जीवाणुओं की संख्या बहुत अधिक है तथा उसके द्वारा उत्पादित विषैले पदार्थ अधिक मात्रा में हुए तो श्वेत-रक्त कणिकाएं जो कि जीवाणुओं को घेर कर युद्ध करती हैं बहुत तेजी से नष्ट होने लगती हैं (चित्र 6 स) और इस प्रकार हमारे शरीर की प्रतिरक्षा प्रणाली को नष्ट करते हुए जीवाणु विभिन्न अंगों में पहुंच जाते हैं और शरीर में रोग उत्पन्न करने में समर्थ होते हैं (अर्थात् वे हमारे शरीर रूपी बैंक को नष्ट करने में सक्षम हो जाते हैं)।

एक तीसरी स्थिति यह भी हो सकती है कि यदि परपोषी में उस जीवाणु के प्रति टीका लगा हो तो ऐसे परपोषी में प्रतिरक्षी (Antibody) बहुत अधिक मात्रा में बन जाते हैं।

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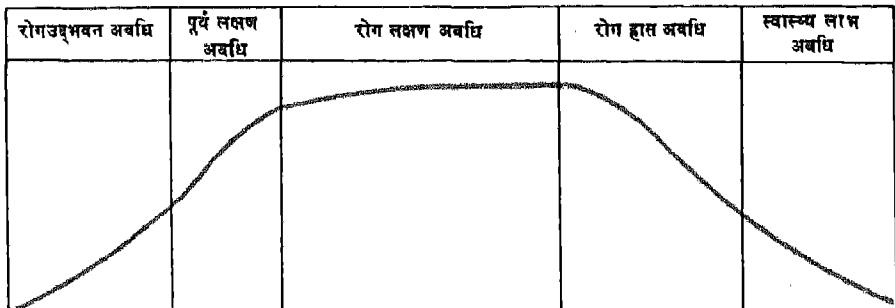
ये प्रतिरक्षी घुसने वाले जीवाणुओं के चारों तरफ चिपक जाते हैं और उसके द्वारा उत्पादित विषैले पदार्थों को निष्क्रिय बना देते हैं। ऐसे प्रतिरक्षियों से घिरे जीवाणुओं को श्वेत रक्त कणिकाएं आसानी से भक्षण करके नष्ट कर देती हैं (चित्र 6 द) यदि रोगी को परपोषी

में ऐन्टिबायोटक दे दें तो यह एक बाहरी सहायता है, जो कि बाहरी पुलिस फोर्स की तरह है जो जीवाणु को नष्ट तथा निष्क्रिय करने में समर्थ है। ऐसे मरते हुए निष्क्रिय जीवाणुओं को श्वेत-रक्त कणिकाएं आसानी से नष्ट कर देती हैं (चित्र 6 य)।

जीवाणुओं द्वारा उत्पादित कुछ विषैले पदार्थ : जीवाणु तरह-तरह के विषैले पदार्थ उत्पन्न करके शरीर में रोग उत्पन्न करने में समर्थ होते हैं। ऐसे ही कुछ जीवाणुओं के विषैले पदार्थों का संक्षिप्त वर्णन नीचे दिया जा रहा है —

(1) **टाक्सिन (विषैले पदार्थ) :** ऐसा पाया गया है कि जब कुछ जीवाणुओं की संख्या में वृद्धि होती है तो वे विषैले पदार्थ बनाते हैं जो कि शरीर के प्रतिरक्षा प्रणाली को हानि पहुंचाते हैं। ये पदार्थ दो प्रकार के होते हैं (अ) **एक्सोटाक्सिन** जैसे **क्लास्ट्रिडियम टेटेनाई** नामक जीवाणु, घाव में वृद्धि करते हैं तो **टेटेनस टाक्सिन** बनाते हैं। रोगी बच्चे या मनुष्य की सारी देह इस विषैले पदार्थ के कारण अकड़ जाती है। **कोरीनीबैक्टीरियम डिफ्फथीरिया** नामक जीवाणु रोगी मनुष्य या बच्चे के शरीर में एक विषैला पदार्थ बनाते हैं जिससे कि बच्चे का पूरा गला फंस जाता है और बच्चे की सांस घुटने लगती है। इसी प्रकार **स्टेफाइलोकोक्कस आरीयस** नामक जीवाणु संदूषित भोजन में **एन्टरोटाक्सिन** नामक जीवविष बनाते हैं जो कि उबालने पर भी नष्ट नहीं होता और जब यह पेट में पहुंचता है तो रोगी को उल्टी और दस्त शुरू हो जाते हैं। एन्टरोटाक्सिन नामक जीवविष कुछ अन्य जीवाणु जैसे **विंबिरिओ कॉलरा :ई० कोलाई:, क्लास्ट्रिडियम परफ्रीजैंस** आदि बनाते हैं।

(2) **इन्डोटाक्सिन :** कुछ जीवाणु जैसे **ई० कोलाई, साल्मोनिला** आदि मरणोपरांत दूध तथा अन्य भोज्य पदार्थों में इंडोटाक्सिन निकालते हैं। ये पदार्थ वसीय घटकों के बने होते हैं तथा **परपोषी- रोगी** के शरीर में बुखार उत्पन्न करते हैं।

(3) **हायलूरिनिडेज :** कुछ गोलाकार और दंडाकार जीवाणु हायलूरिनिडेज नामक विषैला

पदार्थ बनाते हैं जिससे कि ऊत्तक कोशिकाएं एक दूसरे से अलग हो जाती हैं और जीवाणु उत्तकों के बीच घुसते चले जाते हैं।

(4) **लेसिथिनेज :** यह पदार्थ **क्लास्ट्रिडियम परफ्रीजेंस** और कुछ अन्य जीवाणुओं से उत्पादित होता है जो कि विभिन्न ऊत्तक कोशिकाओं तथा रक्त-कणिकाओं का विघटन या संलयन (Haemolysis) करता है।

(5) **कोएगुलेज :** रोगजनक **स्टेफाइलोकोक्काई** कोएगुलेज नामक पदार्थ उत्पन्न करते हैं जो कि फाइब्रिनोजन को फिब्रिन में बदल कर अपने चारों तरफ सुरक्षा की दीवार बनाकर श्वेत-रक्त-कणिकाओं की भक्षण- प्रक्रिया से अपने को बचाने का प्रयास करता है।

(6) **ल्यूकोसाइडिन : स्टेफाइलोकोक्काई** और **स्ट्रेप्टोकोक्काई** ल्यूकोसाइडिन बनाते हैं जो भक्षण करने वाले श्वेत-रक्त-कणिकाओं को नष्ट करते हैं।

रोग की अवस्थाएं : जब जीवाणु शरीर में रोग उत्पन्न करने में सक्षम हो जाते हैं तो रोग

रोगउद्भवत अवधि	पूर्वं लक्षण अवधि	रोग लक्षण अवधि	रोग ह्रास अवधि	स्वास्थ्य लाभ अवधि
यह रोगाणु के शरीर तक पहुंचने और प्रथम लक्षण उत्पन्न होने तक की अवधि है	रोग के प्रथम लक्षण जैसे सर दर्द और बदन दर्द	इसमें रोग के लक्षण अतितीव्र हो जाते हैं जैसे बुखार, कांपना, गले में खराश, अतिसार, मांसपेशियों में दर्द	इसमें रोग के लक्षण घटने लगते हैं।	रोगी स्वास्थ्य लाभ करने लगता है

चित्र 7.

उत्पन्न होने तक उसकी निम्न अवस्थाएं पाई जाती हैं (चित्र 7) ।

(अ) **रोग उद्भवन अवधि (Incubation Period) :** यह रोगाणु के शरीर तक पहुंचने और रोग के प्रथम लक्षण उत्पन्न होने तक की अवधि है । इस अवधि में जीवाणु परपोषी के अंदर अपने लिए अनुकूल वातावरण बनाता है । इस अवधि में जीवाणु शरीर की प्रतिरक्षा प्रणाली पर विजय प्राप्त करके, रोग उत्पन्न करने में सक्षम हो जाते हैं । यह अवधि रोगाणु की रोगजनकता तथा परपोषी की रोग- रोधक क्षमता के अनुसार घटती बढ़ती है । यह भिन्न भिन्न रोगाणुओं में भिन्न भिन्न होती है ।

(ब) **पूर्वलक्षण अवधि (Prodromal Period) :** यह अवधि कम अंतराल की होती है तथा उद्भवन अवधि के तुरन्त बाद की होती है । इसमें रोग के प्रथम लक्षण जैसे सरदर्द, बदन दर्द आदि उत्पन्न होते हैं ।

(स) **रोग लक्षण अवधि (Period of Illness) :** रोग की इस अवस्था में रोग के लक्षण अतितीव्र होते हैं । रोगी में रोग के लक्षण जैसे बुखार, कांपना, मांसपेशियों में दर्द, गले में खराश, अतिसार आदि पूर्णरूप से दिखाई पड़ते हैं ।

(द) **रोग ह्रास की अवधि (Period of Decline) :** इसमें बुखार कम होने लगता है। शरीर का दर्द घटने लगता है । इसकी अवधि, लक्षण घटने के साथ कम ज्यादा हो सकती है ।

(य) **स्वास्थ्य लाभ की अवधि (Period of Convalescence) :** यह रोग की वह अवस्था है जिसमें रोगी स्वास्थ्य लाभ करने लगता है । उसकी आंतरिक शक्ति लौटने लगती है और रोगी रोग से पूर्व की अवस्था में लौटने लगता है ।

रोग के प्रकार : रोग किस प्रकार फैलते हैं तथा उनकी प्रकृति क्या है इस आधार पर रोगों के कई प्रकार बनाये गये हैं जैसे -

(1) **संचरणीय रोग (Communicable Disease) :** वे रोग जो एक परपोषी से दूसरे परपोषी तक प्रत्यक्ष या अप्रत्यक्ष संसर्ग से फैलते हैं, जैसे टायफाइड, टी० बी० आदि।

(2) **असंचरणीय रोग (Non Communicable Disease) :** वे रोग जो शरीर में रहने वाले जीवाणुओं द्वारा यदाकदा उत्पन्न हो जाते हैं या ऐसे जीवाणुओं द्वारा उत्पन्न होने वाले रोग जिनके कारक सामान्यतः हमेशा शरीर के बाहर रहते हैं परन्तु यदि शरीर में पहुंच जायें तो रोग उत्पन्न करते हैं, जैसे टिटेनस के जीवाणु अगर घाव के द्वारा शरीर में पहुंच जायें तो टिटेनस रोग उत्पन्न हो जाता है।

(3) **सांसर्गिक रोग (Contagious Disease) :** ऐसे रोग जो आसानी से एक मनुष्य से दूसरे मनुष्य को लग जायें जैसे चेचक का रोग।

(4) **महामारी रोग (Epidemic Disease) :** किसी रोग को महामारी रोग तब कहते हैं जब यह थोड़े समय में किसी स्थान पर ज्यादा लोगों को प्रभावित करे, जैसे इन्फ्लुऐंजा, मीज़ल आदि।

(5) **देशान्तरगामी महामारी रोग (Pandemic Disease) :** कोई रोग जब सारे विश्व को अपने चंगुल में ले ले, जैसे 1950 का फ्लू रोग सारे विश्व में फैला था।

(6) **स्थानिक रोग (Endemic Disease) :** ऐसे रोग जो किसी जगह पर लोगों में लगातार बने रहते हैं जैसे जुकाम, मलेरिया आदि।

(7) **छुट- पुट रोग (Sporadic Disease) :** ऐसे रोग जो यदाकदा लोगों को हो जायें जैसे पोलियो का रोग।

(8) **तीव्र रोग (Acute Disease) :** जो रोग तेजी से लग जायें और शरीर में थोड़े समय तक बना रहे, जैसे इन्फ्लुऐंजा।

(9) **चिरकालिक रोग (Chronic Disease) :** ऐसे रोग जो शरीर में धीरे-धीरे उत्पन्न

हों तथा उनके लक्षण तीव्र न हों और वे शरीर में बहुत समय तक बने रहें जैसे टी० बी०, सिफलिस, लेप्रेसी आदि ।

(10) **पशुजनित रोग (Zoonoses)** : वे रोग जो पशुओं में से मनुष्य को लग जाते हैं जैसे ब्रुसलोसिस, टी० बी० आदि ।

रोग सम्बन्धी कुछ अन्य बातें

1. **शरीर में जीवाणुओं के घुसने के प्रवेश द्वार** : जीवाणु कई रास्तों से शरीर में घुस पाते हैं । इनमें कुछ मुख्य इस प्रकार हैं —

   (क) **श्वसन के द्वारा** : जब हम सांस लेते हैं तो अंदर जाती वायु के साथ संदूषित द्रव-कण, जीवाणु, धूल के कण जिन पर रोगाणु हो सकते हैं, **कवक के बीजाणु** आदि सभी घुस जाते हैं । रोगाणु श्वसन प्रणाली की श्लेष्मिक झिल्लियों (Mucous Membranes) को पार कर रोग उत्पन्न करने में समर्थ हो जाते हैं । इस प्रकार से प्रविष्ट जीवाणुओं से कुछ होने वाले रोग हैं - न्यूमोनिया, टी० बी०, इन्फलुऐंजा, माता का रोग, मीज़ल आदि ।

   (ख) **जठरांत्रप्रणाली (Gaestro-intestinal Tract) द्वारा** : यह प्रणाली शरीर में जीवाणुओं के घुसने का एक मुख्य रास्ता है । संदूषित भोजन, पानी, दूध तथा अन्य भोज्य पदार्थों में उपस्थित रोगाणु जब इस प्रवेश द्वार से घुसते हैं तो जठर रस में उपस्थित हाइड्रोक्लोरिक अम्ल उनको काफी संख्या में मार देता है । परन्तु इस हनन के बाद जो बच निकलते हैं वे रोग उत्पन्न करने में सक्षम होते हैं । वे जठरांत्र प्रणाली के श्लेष्मिक झिल्ली को पार कर शरीर में प्रवेश पा लेते हैं और रोग उत्पन्न करते हैं जैसे लकवा का रोग, इनफेक्शियस हेपेटाइटिस, टायफाइड फीवर, कॉलरा, अमीबिक डिसेंट्री, अतिसार, भोजन विषाक्तता आदि । इस प्रवेश द्वार से घुसे जीवाणु मल में बहुत ज्यादा संख्या में

बाहर निकलते रहते हैं और इनसे जल, भोज्य पदार्थ एवं हाथ संदूषित होते रहते हैं।

(ग) **प्रजनन अंगों के द्वारा** : प्रजनन अंगों में रोग उत्पन्न करने वाले जीवाणु मुख्यतः इसी प्रवेश द्वार से घुसते हैं। प्रजनन रोगों जैसे एड्स, सिफलिस, गोनोरिया, संसर्गी गर्भपात के रोगाणु प्रजनन अंगों की श्लेष्मिक झिल्लियों को पार कर इन अंगों में प्रवेश पा लेते हैं।

(घ) **त्वचा के द्वारा** : वैसे तो रोगाणु त्वचा को पार नहीं कर सकते हैं परन्तु यदि किसी विधि से ये त्वचा के नीचे क्षेपित हो जायें तो वे रोग उत्पन्न करने में सक्षम हो जाते हैं - जैसे मलेरिया में मच्छर त्वचा को छेदकर खून चूसते हैं उसी समय मलेरिया के रोगाणु त्वचा के नीचे क्षेपित हो जाते हैं। त्वचा में संदूषित सुई से इंजेक्शन लगाते समय या कुत्ते, बिल्ली, बन्दर आदि के काटने से या किसी चीज से घाव बन जाने में जब त्वचा कटती है तो जीवाणु इस बने प्रवेश द्वार से घुस कर रोग उतपन्न कर सकते हैं। इस विधि से बने प्रवेश द्वार से घुस कर रोग उत्पन्न कर सकते हैं। इस विधि से बने प्रवेश द्वार को आंत्रेत्तर विधि (Parentral Route) भी कहते हैं। इस विधि से होने वाले रोग हैं - रैबीज, मलेरिया, एंथ्रेक्स आदि।

(2) **जीवाणुओं के शरीर से बाहर निकलने के रास्ते** : रोगाणु एक परपोषी में रोग उत्पन्न करने के बाद अपना जीवन चक्र चलते रहने के लिए रोगी परपोषी के शरीर के विभिन्न रास्तों से निकल कर अन्य स्वस्थ परपोषी तक पहुंचने का प्रयास करते हैं। इन रास्तों में श्वसन के द्वारा रोगाणुओं का बाहर निकलना बहुत अधिक होता है। रोगी मनुष्य के थूक या नाक से निकले उत्सर्जी पदार्थ, फेफड़ों से निकली वायु या खांसते समय मुख से निकले द्रव-कणों में रोगाणुओं की संख्या बहुत अधिक

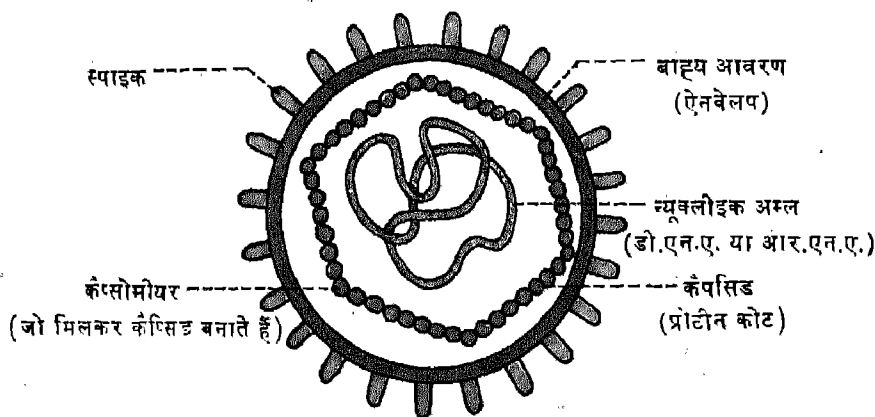
होती है और इन संदूषित पदार्थों से स्वस्थ मनुष्यों को रोग लग सकते हैं। कुछ रोगों जैसे टी० बी०, हूपिंग कफ (काली खांसी), न्यूमोनिया, मीजल, मम्स, चेचक, इन्फलुऐंजा आदि के रोगाणुओं का फैलाव मुख्यतः श्वसन के द्वारा होता है। रोगाणुओं के बाहर निकलने की दूसरी मुख्य विधि मल द्वारा है। मल में निष्कासित होने वाले कुछ रोगों के जीवाणु हैं कॉलरा, टायफाइड, पैराटायफाइड, अतिसार, अमीबिक डिसेंट्री और लकवा आदि के कारक। तीसरी विधि जो रोगाणु शरीर से बाहर निकलने के लिए प्रयुक्त करते हैं वह है मूत्र तथा जनन अंगों से निकलने वाले उत्सर्जी पदार्थ। इस श्रेणी के रोग हैं - एड्स, टायफाइड-फीवर, ब्रुसलोसिस, सिफलिस, गोनौरिया आदि। त्वचा में हुए घाव से निकलने वाले पीव से स्टेफाइलोकोक्काई जैसे रोगाणुओं का फैलाव बहुत तेजी से होता है।

अध्याय 4

विषाणुओं का रूप, आकार एवं रचना

चेचक, एड्स, पोलियो,रेबीज, ममूस, चिकेन पाक्स, इन्फ्लुऐंजा आदि बहुत से रोग जीवाणुओं से भी सूक्ष्म जीव जिन्हें "विषाणु" कहते हैं, द्वारा होते हैं। जिस निस्यंदक (Filter) से जीवाणु छन कर नहीं निकल पाते हैं उससे ये विषाणु छनकर निकल जाते हैं। इसीलिए पहले इन विषाणुओं को निस्यंदी विषाणु (Filterable Virus) भी कहतेथे। परन्तु अब निस्यंदी शब्द को हटाकर केवल "विषाणु" शब्द का प्रयोग किया जाने लगा है। "विषाणु" या वाइरस शब्द का अर्थ है "विष" या "जहर"। अब विषाणु शब्द का प्रयोग उन सूक्ष्म जीवाणुओं के लिए किया जाता है जो कि अति सूक्ष्म हैं, जीवाणु- निस्यंदक से निस्यंदनीय हैं तथा सामान्य सूक्ष्मदर्शी से नहीं देखे जा सकते हैं। इनको केवल इलेक्ट्रान सूक्ष्मदर्शी की मदद से ही देखा जा सकता है। विषाणु केवल जीवित कोशिकाओं में ही वृद्धि कर सकते हैं। ये कोशिकायें चाहे मानव की हों, पशुओं की हों, पादपों की हो, कवक हों या जीवाणुओं की हों, विषाणु सभी में वृद्धि करने में सक्षम हैं तथा उनमें रोग उत्पन्न कर सकते हैं। कोशिका से बाहर होने पर ये विषाणु एक असक्रिय, अजीवित, तथा रासायनिक अणुओं के एक जटिल समूह हैं। इसलिए कुछ वैज्ञानिक इन विषाणुओं को

अजीवित कहते हैं जबकि अधिकाँश इन्हें जीवित मानते हैं क्योंकि ये जीवित कोशिकाओं के अंदर ही प्रजनन करते हैं। तथा जीवित जीवाणुओं की तरह अपने वंश की वृद्धि करते हैं। वैज्ञानिक इन विषाणुओं को जीवित और अजीवित के बीच की कड़ी मानते हैं। वैज्ञानिकों का विचार है कि यदि इन विषाणुओं को अच्छी तरह समझ लिया जाए तो पृथ्वी पर जीवन- उत्पत्ती की जटिल गुत्थी को अच्छी प्रकार से समझा जा सकता है।

विषाणुओं के रासायनिक संगठन के अध्ययन से पता लगा है कि विषाणुओं में (1) केवल एक प्रकार का न्यूक्लीक अम्ल, "डी- आक्सीराइबो न्यूक्लीक अम्ल" (डी० एन० ए०) या राइबोन्यूक्लीक अम्ल (आर० एन० ए०) मिल सकता है। (2) न्यूक्लीक अम्ल एक ऐसे आवरण से घिरा रहता है जो कि प्रोटीन का बना होता है। और जिसे "प्रोटीन- कोट" या "कैपसिड" (Capsid) कहते हैं (चित्र 8)। (3) किन्हीं किन्हीं विषाणुओं में प्रोटीन- कोट के अतिरिक्त एक और आवरण होता है जिसे "बाह्य आवरण" या ऐनवेलप (Envelop) कहते हैं जो कि लिपिड, प्रोटीन और कार्बोहाइड्रेट का बना होता है। जिन विषाणुओं में यह आवरण नहीं होता उन्हें "अनावृत विषाणु" (Naked Virus) कहते हैं। (4) विषाणु केवल जीवित कोशिकाओं (परपोषी कोशिका) के अंदर

चित्र 8.

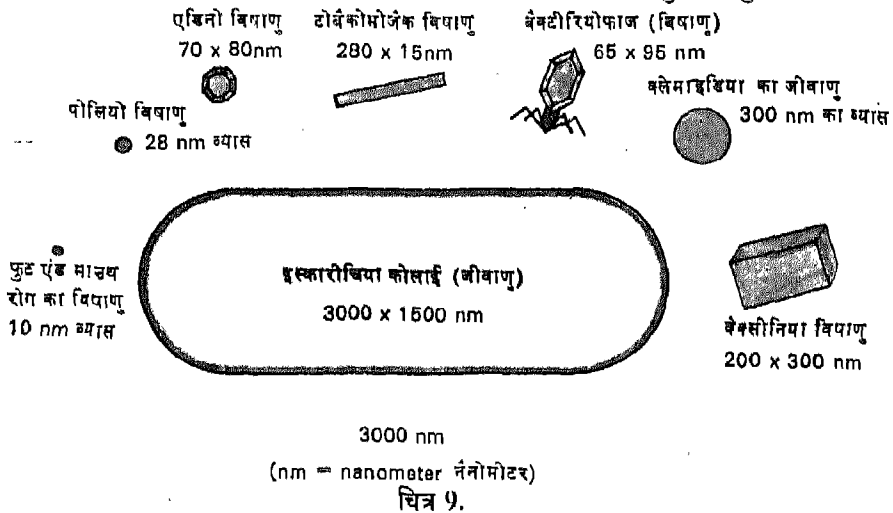
उसी के (परपोषी कोशिका के) संश्लेषण करने वाले एंजाइमों का उपयोग करके वृद्धि करते हैं। (5) वृद्धि करते समय एक ऐसे विशेष पदार्थ का निर्माण करते हैं जो विषाणु "न्यूक्लीक अम्ल" को एक कोशिका से दूसरे कोशिका तक पहुंचाने में सहायक होता है।

विषाणु मनुष्यों, पशुओं, पादपों, कवकों और जीवाणुओं में रोग उत्पन्न करने में सक्षम हैं। विषाणु मनुष्यों में चेचक, मीजल, इन्फ्लुऐंजा, पोलियो, एड्स, रेबीज, कैंसर, हिपेटाइटिस, चिकेन पाक्स आदि रोग उत्पन्न करते हैं। पशुओं में विषाणुओं द्वारा उत्पन्न होने वाले कुछ रोग हैं- रिंडरपेस्ट, "फुट एंड माउथ" रेबीज, रानीखेत आदि। पादपों में विषाणुओं द्वारा उत्पन्न होने वाले रोगों के नाम हैं- टोबैको मोजेक, पोटैटो ड्वार्फ, कालीप्लावर मोजेक आदि। **बैक्टीरियोफाज** नामक विषाणु कुछ जीवाणुओं जैसे **ई० कोलाई** को नष्ट करते हैं। इस प्रकार विषाणुओं की रोग- उत्पादन- क्षमता बहुत अधिक है क्योंकि ये विभिन्न प्रकार की कोशिकाओं को प्रभावित करके रोग उत्पन्न करने में सक्षम हैं। (तालिका नं. 4.1)।

विषाणुओं के आकार भिन्न-भिन्न होते हैं। इनके आकार का व्यास 10 नैनोमीटर से लेकर 300 नैनोमीटर तक हो सकता है (चित्र 9)। चित्र में कुछ विषाणुओं के आकार इस्करीचिया कोलाई नामक जीवाणु के आकार की तुलना में दिखाये गये हैं। इनमें सबसे छोटा विषाणु पशुओं में रोग उत्पन्न करने वाले "फुट एंड माउथ" का विषाणु है जो कि 10 नैनोमीटर व्यास का होता है जबकि मनुष्यों में चेचक रोग उत्पन्न करने वाले विषाणु सबसे बड़ा अर्थात् 200×300 नैनोमीटर आकार(चौकोर) का होता है। यह सबसे बड़ा विषाणु है जो कि प्रकृति में पाये जाने वाले सबसे छोटे जीवाणु "क्लेमाइडिया" जिसका व्यास लगभग 300 नैनोमीटर होता है, के आकार के बराबर होता है।

विषाणुओं की खोज का इतिहास भी बड़ा रोचक है। कुछ विषाणुओं की बीमारियां सदियों पहले लोगों को पता थीं जैसे चेचक का रोग। इसको रोकने के प्रयास सैंकड़ों साल

(nm = nanometer नैनोमीटर)

चित्र 9.

पूर्व शुरू हुए थे परन्तु पहली सफलता एडवर्ड जेनर को 1796 में मिली जब उन्होंने आठ वर्ष के एक बालक जेम्स पिप्पस को चेचक रोग का टीका लगाया था। उन्होंने एक ग्वाले के हाथ में हुए काऊ पाक्स (Cow Pox) रोग द्वारा उत्पन्न घाव से निकले तरल पदार्थ को टीके के रूप में प्रयुक्त किया। उस समय न तो मनुष्यों के चेचक के विषाणु का कुछ पता था न ही काऊ पाक्स का। परन्तु जेनर द्वारा टीके के लिए प्रयुक्त यह विधि धीरे-धीरे सारे यूरोप में प्रयुक्त होने लगी और आज इस विधि के फलस्वरूप पूरे विश्व में चेचक रोग पर विजय प्राप्त कर ली गयी है। जेनर के बाद सन् 1885 में लूइस पास्चर ने फ्रांस में विषाणु द्वारा उत्पन्न रेबीज रोग के लिये टीका बनाया और आज उन्हीं की विधि में कुछ परिवर्तन करके विश्वभर में रेबीज पर विजय प्राप्त करने का अभियान जारी है। इन अनुसंधानकर्ताओं को उस समय तक इन रोगों के विषाणु के विषय में न तो पता था और न ही उसका विलगन किया जा सका था। रोगों से विषाणु विलगित करने की पहली

सफलता रूसी वैज्ञानिक दिमीत्री एवनास्की को सन् 1892 में मिली जबकि उन्होंने पहली बार तम्बाकू में मौजेक रोग उत्पन्न करने वाले "टोबेको मोजेक" विषाणु का विलगन किया। राकफ्लेकर मेडिकल इन्स्टीट्यूट के डा. विडेल स्टेनले ने तो इन टोबेको मोजेक विषाणु का क्रिस्ट्रीकरण करके सारे विश्व को अचम्भे में डाल दिया और उन्होंने यह भी प्रदर्शित किया कि इन विषाणुओं के क्रिस्टल को तम्बाकू की पत्ती पर डाला जाए तो मोजेक का रोग फिर उत्पन्न हो जाता है। उनके इस शोध कार्य से विषाणु जगत में झगड़ा खड़ा हो गया कि विषाणु जीवित हैं या अजीवित ? उनके इस शोधकार्य पर सन् 1946 में उन्हें नोवेल पुरस्कार से सम्मानित किया गया।

तालिका नं. 4.1 विषाणु द्वारा उत्पन्न रोगों की विस्तृत तालिका

मनुष्यों के रोग	अन्य स्तनधारियों एवं पक्षियों के रोग	मछलियों के रोग	कीटों के रोग	पौधों के रोग
स्माल पाक्स (चेचक)	हांग कालरा	कार्प पाक्स	सेक्यूड (मधुमक्खी)	डिजीज लाइटिक रोग
चिकेन पाक्स	फुट एंड माउथ	इथीथिलियोमा आफ बारबम	पोलीहेडरल रोग	टोबैको
हरपीस सिम्पेलक्स	बेसीकुलर इंजथीमा		जिप्सी मोथ	कुकम्बर
हरपीस जोस्टर	बेसीकुलर स्टोमेटाइटिस		कैटरपिलर	टोमेटो
मोलस्कम कंटीजिओसम	केनाइन डिसटेम्पर		टेंट कैटरपिलर	लेट्यूस
रैबीज	रैबीज		यूरोपियन मोथ	कैवेज
फ्लूफीवार	इनसेफेलोमाइलाइटिस (अश्वों में)		कैटरपिलर	पोटेटो

मनुष्यों के रोग	अन्य स्तनधारियों एवं पक्षियों के रोग	मछलियों के रोग	कीटों के रोग	पौधों के रोग
मम्स	स्वाइन इन्फ्लूएंजा		सिल्कवर्म (जांडिस)	सुगरकेन
पोलिओमाइलाइटिस	मिक्सोमटोसिस (रैबिट में)		कैलीफोर्निया	रिंगस्पाट रोग
डेंगु फीवर	रिंडरपेस्ट		ओक वर्म	टोबैको
रूबेला	शीप पाक्स		अलुफा अल्फा	ब्रेकिंग रोग
रूविओला	लूपिंग इल (भेड़ों में)			
इन्फ्लुएंजा	राउस सारकोमा			
वेस्ट- नाइल- फीवर	फाउल प्लेग			
काक्जेकी विषाणु संकरण	न्यूकैसिल रोग			
	फाउल ल्यूकीमिया			

विषाणुओं की रचना एवं रूप

न्यूक्लीक अम्ल : जैसा पहले बता चुके हैं, विषाणुओं में एक ही प्रकार का न्यूक्लीक अम्ल होता है। यह या तो डी० एन० ए० होता है या आर० एन० ए० , दोनों नहीं। इसके विपरीत मानव, पादप और जीवाणु कोशिकाओं में डी० एन० ए० एक मूलभूत प्रजनन पदार्थ के रूप में होता है और उसके साथ ही आर० एन० ए० भी अवश्य होता है, जो एक सहायक पदार्थ की भूमिका निभाता है।

विषाणु के न्यूक्लीक अम्ल, जो कि एक ही प्रकार के होते हैं, की प्रतिशत मात्रा प्रोटीन की तुलना में लगभग एक प्रतिशत होती है (जैसे इन्फ्लुएंजा विषाणु में) जबकि बैक्टीरियोफाज नामक विषाणु में अम्ल की मात्रा बढ़कर 50% हो जाती है। विषाणु के न्यूक्लीक अम्ल की रचना में कुछ हजार न्यूक्लीयोटाइड (बेस पेयर) से लेकर ढाई लाख तक न्यूक्लीयोटाइड भाग ले सकते हैं। विषाणु में उपस्थित न्यूक्लीक अम्ल डी० एन०

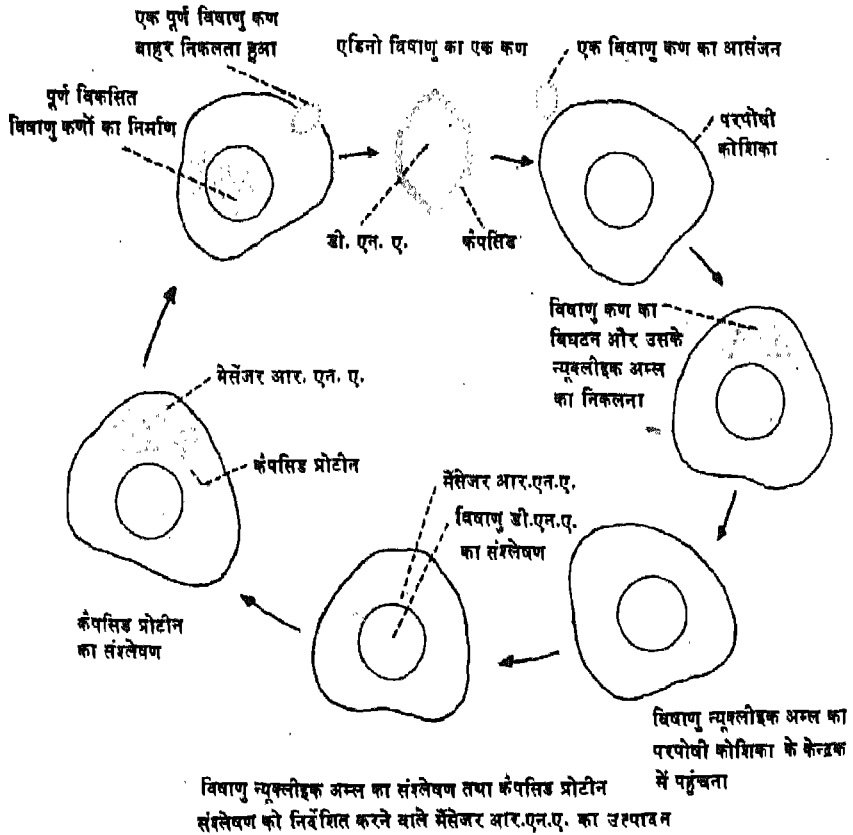
ए० के अणु या तो द्विलड़ीय डी० एन० ए० (Double Stranded DNA) या एक लड़ीय डी० एन० ए० (Single Stranded DNA) हो सकते हैं। इसी प्रकार विषाणुओं में पाया जाने वाला आर० एन० ए० अणु भी एक लड़ीय आर० एन० ए० या द्विलड़ीय आर० एन० ए० हो सकता है। उदाहरण के लिये माता रोग (चेचक) के विषाणु का न्यूक्लीक अम्ल द्विलड़ीय डी० एन० ए० से बना होता है जबकि चूहों एवं हेम्स्टर में रोग उत्पन्न करने वाला एडिनो विषाणु का न्यूक्लीक अम्ल एक लड़ीय डी० एन० ए० का बना होता है। न्यूक्लीक अम्ल का एक या द्विलड़ीय गुण विभिन्न रोग के विषाणुओं को पहचानने में बहुत ही सहायक सिद्ध हुआ है। इसी प्रकार विषाणु की रचना के अनुसार न्यूक्लीक अम्ल रेखाकार, गोलाकार, या किन्हीं विषाणुओं (जैसे इन्फ्लुऐंजा विषाणु) में छोटे छोटे कई अणुओं में बंटे रहते हैं।

कैप्सिड और बाह्य आवरण

विषाणुओं का न्यूक्लीक अम्ल एक प्रोटीन आवरण से घिरा रहता है जिसे "कैपसिड" कहते हैं। (चित्र 8) कैपसिड छोटे छोटे प्रोटीन समूहों से मिलकर बनते हैं जिन्हें कैप्सोमीयर कहते हैं। कुछ विषाणुओं में कैप्सोमीयर एक ही प्रकार के प्रोटीन से बने होते हैं। जबकि अन्य विषाणुओं में कैप्सोमीयर में कई प्रकार के प्रोटीन उपस्थित होते हैं।

कुछ विषाणुओं में कैपसिड के ऊपर एक और बाह्य आवरण होता है। जो लिपिड, प्रोटीन एवं कार्बोहाइड्रेट के सम्मिश्रण से बना होता है। इन्फ्लुऐंजा विषाणु कणों के बाह्य आवरण की बाहरी सतह पर एक अन्य रचना होती है जिसे "स्पाइक" कहते हैं। यही विषाणु लाल रक्त कणों के बीच जुड़कर रुधिर समूहन (Haemagglutination) कर देते हैं। जिन विषाणुओं में यह बाह्य आवरण नहीं होता उन्हें "अनावृत विषाणु" कहते हैं।

विषाणु एक परपोषी कोशिका में वृद्धि करके कैसे रोग उत्पन्न करते हैं ?

संदूषण के समय परपोषी- कोशिका के पास पहुँचकर विषाणु- कण परपोषी कोशिका

चित्र 10.

की बाह्य सतह पर आसंजित हो जाते हैं। आसंजन के उपरान्त विषाणु- कण परपोषी कोशिका के अंदर अंतःपुटिका की मदद से पहुंच जाते हैं (चित्र 10)। परपोषी कोशिका द्रव के अंदर विषाणु कण का न्यूक्लीक अम्ल निकलकर परपोषी कोशिका के केन्द्रक में पहुंच जाता है। यहां यह अपने लिए कुछ विशेष एंजाइम बनाता है। ये एन्जाइम विषाणु

कणों के बनने के लिए आवश्यक न्यूक्लीक अम्ल बनाते हैं। बने हुए न्यूक्लीक अम्ल अणु कुछ नये मेसेंजर आर० एन० ए० बनाते हैं जो कि परपोषी कोशिका के जीव- द्रव में पहुंचकर तथा परपोषी कोशिका संश्लेशण तंत्रिका का उपयोग करके विषाणु के लिए कैप सिड प्रोटीन का संश्लेषण करते हैं। बाद में यही प्रोटीन अणु परपोषी कोशिका के केन्द्रक में पहुंच कर विषाणु के न्यूक्लीक अम्ल के चारों तरफ कैपसिड आवरण बनाकर एक नये विषाणु कण की रचना कर देते हैं (चित्र 10) धीरे-धीरे नये विषाणु कणों की संख्या परपोषी कोशिका में बढ़ जाती है तथा कोशिका नष्ट हो जाती है और उनसे निकले असंख्य विषाणु कण नये परपोषी कोशिकाओं को प्रभावित करने के लिए बिखर जाते हैं। इस प्रक्रिया मे जैसे जैसे विषाणु कणों की संख्या बढ़ती जाती है परपोषी में उस रोग के लक्षण उत्पन्न होने लगते हैं। विषाणु कण के परपोषी कोशिका में वृद्धि करने की कुछ अवस्थाओं को चित्र 10 में दर्शाया गया है। विषाणु कणों की परपोषी कोशिकाओं को नष्ट करने की क्षमता को "साइटोपैथिक इफेक्ट" (Cytopathic Effect या CPE) कहते हैं। विषाणु के इस गुण के कारण इनसे उत्पन्न रोगों के निदान में बहुत सहायता मिलती है। सी० पी० ई० का एक प्रकार का अंतःस्थ पिंड (Inclusion Body) होता है जो कि परपोषी कोशिका के केन्द्रक या कोशिका- द्रव में परिपक्व या अपरिपक्व विषाणुओं के संचयन से बनते हैं। रेबीज एक भयानक रोग है जो कि मनुष्यों को पागल कुत्तों के काटने से होता है। इससे मनुष्य पागल होकर मर जाता है। इसके लक्षण यदि एक बार उत्पन्न हो जायें तो इलाज असंभव है। इस रोग का निदान मृत रोगी- कुत्ते के तंत्रिका कोशिका में नेग्री बाडी नामक अंतःस्थ पिंड की उपस्थिति से ही किया जाता है।

विषाणु जन्य रोग से ग्रसित रोगी के शरीर में एक महत्वपूर्ण पदार्थ "इन्टरफिरान" का निर्माण होता है जो कि परपोषी- कोशिका को विषाणु के संक्रमण से बचाता है। आजकल "संश्लेषित इंटरफिरान" से विषाणु रोगों एवं कैंसर से मनुष्यों के बचाव के

प्रयास किये जा रहे हैं।

विषाणु और कैंसर : जब कोशिकाएं अनियमित रूप से वृद्धि करने लगती हैं तो उनसे जो ऊतक (Tissue) बनता है उसे "ट्यूमर" (Tumour) कहते हैं। जब "ट्यूमर" सांधातिक रूप से शरीर में फैलने लगते हैं तब इन्हें "सांधातिक ट्यूमर" (Malignant Tumour) कहते हैं। सांधातिक कोशिकाएं अनियंत्रित रूप से वृद्धि करके पूरे शरीर में व्याप्त हो जाती हैं और मृत्यु का कारण बन जाती हैं। हर प्रकार के कैंसर में सांधातिक ट्यूमर नहीं बनते बल्कि कुछ कोशिकाएं जैसे कि श्वेत- रक्त- कणिकाएं यदि कैंसर कोशिका के रूप में परिवर्तित होती है तो श्वेत- रक्त- कणिकाओं की संख्या रक्त में बढ़ जाती है यही "ल्यूकोमिया नामक कैंसर" के रूप में जाना जाता है।

1908 में यह प्रथम बार ज्ञात हुआ कि कैंसर का सम्बन्ध विषाणुओं से है। मुर्गियों में ल्यूकोमिया का रोग "निस्यंदकीय कोशिका रहित पदार्थ" से उत्पन्न किया जा सकता है। चुहियों में स्तन का ट्यूमर माँ से बच्चों में उसके दूध के माध्यम से फैलता है।

वैज्ञानिकों का मत है कि स्वस्थ केन्द्रकीय कोशिकाओं के क्रोमोसोम में कैंसर उत्पादी- जीन होते हैं जिन्हें आंकोजीन (Oncogene) कहते हैं। इनमें यदि किसी प्रकार का परिवर्तन आ जाये तो वह कोशिका "कैंसर- कोशिका" में परिवर्तित हो जाती है। सामान्य दशा में "आंकोजीन" एक ऐसा प्रोटीन बनाते हैं जो कोशिका की सामान्य वृद्धि के लिए आवश्यक हैं, परन्तु इस आंकोजीन में किसी प्रकार का उत्परिवर्तन (Mutation) होने पर यह कोशिका को "कैंसर- कोशिका" में परिवर्तित कर देता है। आंकोजीन में यह उत्परिवर्तन कई कारणों से हो सकता है जैसे विभिन्न प्रकार के उत्परिवर्तन लाने वाले रसायन पदार्थ, रेडियोधर्मिता और विषाणु। जो विषाणु ट्यूमर उत्पन्न करने में समर्थ हैं उन्हें "आंकोजीन विषाणु" (Oncogene Virus) कहते हैं। मानव/पशु कोशिकाओं में अब तक 24 आंकोजीन का पता लग चुका है (तालिका 4.2) इस तालिका में कुछ

तालिका 4.2 मानव कोशिकाओं से विलगित कुछ प्रतिनिधि कोशिका आंकोजीन

आंकोजीन	कैंसर कोशिका	विषाणु	मानव गुण सूत्रों में उपस्थित गुणसूत्रों की संख्या
एब्ल (abl)	क्रानिक माइलोजीन ल्यूकीमिया	एवलसन क्यूराइन ल्यूकीमिया विषाणु	9
फेस (fes)	एक्यूट प्रोमाइलोसिटिक ल्यूकीमिया	फिलाइन सारकोमा विषाणु	15
फास (fos)	बरकिट लिम्फोमा	एफ० बी० जे० आर्स्टीयोसारकोमा विषाणु	2
मास (mos)	एक्यूट माइलोब्लास्टिक ल्यूकीमिया	मोलोनीम्यूराइन सारकोमा विषाणु	8
मिब (myb)	एक्यूट लिम्फोसिटिक ल्यूकीमिया	एवियन माइलोब्लास्टोसिस विषाणु	6
मिक (myc)	बरकिट लिम्फोमा	एवियन माइलोसाइटोमटोसिस विषाणु	8
रास एच- 1 (ras H_1)	विल्मूस ट्यूमर	हारवे म्यूराइन सारकोमा विषाणु	11
रास एन (ras N)	एक्यूट लिम्फोसिटिक ल्यूकीमिया	विषाणुओं द्वारा नहीं	1
रास के- 2 (ras K-2)	ल्यूकीमिया लिम्फोसिटिक ल्यूकीमिया	क्रिस्टेन म्यूराइन सारकोमा विषाणु	12
सिस (sis)	बरकिट लिम्फोमा क्रानिकमाइलोजीनस ल्यूकीमिया	सिमियन सारकोमा विषाणु	22

(पीडी यूस्टेचिओ एवं एल फिरू (1984) के सौजन्य से, अमेरिकन साइंटिस्ट 92,34-40, वायोसाइंस 34,75-77)

विषाणुओं के भी नाम दिये गये हैं जो कि ट्यूमर उत्पन्न करने से संबंधित पाये गये हैं। अभी हाल ही में वेलर कालेज आफ मेडिसिन के डा० विलियम टी० शीरर ने प्रमाणों से यह सिद्ध किया है कि मनुष्यों में ई० वी० विषाणु का संबंध कैंसर उत्पादन से है।

सामान्य कोशिकाएं जब वृद्धि करती हैं तो वे फैलती हैं उनका यह फैलाव तब रुक जाता है जब उनका संसर्ग एक दूसरी फैलती कोशिका से होता है। सामान्य कोशिकाओं के गुण को "कांटैक्ट इन्हीबिशन" कहते हैं। जब कोशिकाएं कैंसर कोशिकाएं बन जाती हैं तो उनका यह "कांटैक्ट इन्हीबिशन" गुण खत्म हो जाता है और वे वृद्धि करते-करते ट्यूमर का रूप धार लेती हैं। परिवर्तित कैंसर- कोशिका की ऊपरी सतह पर एक विशेष प्रतिजन (Antigen) उत्पन्न हो जाते हैं जिन्हें ट्यूमर स्पेसिफिक "ट्रांस्प्लांटेशन एंटीजन" (टी० एस० टी० ए०) कहते हैं तथा उनके केन्द्रक में एक और भी प्रतिजन और उत्पन्न हो जाता है जिसे टी० एंटीजन कहते हैं। यह भी देखा गया है कि कैंसर- कोशिका सामान्य कोशिकाओं से बड़ी तथा गोल हो जाती है। इन परिवर्तित कोशिकाओं के गुणसूत्रों की संख्या भी असामान्य हो जाती है और वे केन्द्रक में टूटे फूटे दिखाई पड़ते हैं।

अध्याय 5

जीवाणु-हनन

अगर शरीर कहीं कट जाता है तो माता-पिता बच्चों से कहते हैं– साफ करके डेटॉल या टिंचर लगा लो। ये पदार्थ क्या करते हैं ? ये पदार्थ घाव में उपस्थित जीवाणुओं का हनन करते हैं जिससे कि घाव में पस न पड़े।

वैज्ञानिक विधि से जीवाणुओं का हनन लगभग 100 वर्ष पूर्व शुरू हुआ था। उससे पहले जब महामारी जैसे प्लेग, हैजा, चेचक आदि फैलती थी तो घर के घर, गाँव के गाँव मनुष्यों से विहीन हो जाते थे। आधुनिक काल में प्रयुक्त होने वाली जीवाणु हनन विधियों के जन्मदाता दो वैज्ञानिक माने जाते हैं। इनमें से एक थे हंगरी के सेमेलवीस (1816-1865) जो वियना के अस्पताल में चिकित्सक थे। उन्होंने अस्पताल के हर चिकित्सक एवं कार्यकर्ता को यह आदेश दिया था कि वे अपने हाथों को क्लोरीन युक्त पानी से धोयें। उनकी इस विधि से अस्पताल में विभिन्न रोगों के मरीजों की संख्या कम हो गयी थी। दूसरे वैज्ञानिक थे इंग्लैंड के डाक्टर लिस्टर जिन्होंने रोगाणुरोधक शल्यचिकित्सा (Antiseptic Surgery) को जन्म दिया। उन्होंने यह बताया कि शल्यक्रिया में प्रयुक्त होने वाले औजारों को रोगाणु रहित या निर्जर्मीकरण

(Sterilization) करने के लिए उनको गरम करना चाहिए तथा घावों पर फिनाल का प्रयोग करना चाहिए। आज इन दोनों वैज्ञानिकों के सिद्धांतों में बहुत प्रगति हो चुकी है तथा जीवाणु- हनन की अत्यन्त आधुनिक विधियों का विकास हो चुका है।

पिछले अध्यायों में हम यह जान चुके हैं कि जीवाणुओं की दो मुख्य अवस्थाएं होती हैं - एक अवस्था जिसमें जीवाणुओं के अन्दर बीजाणु नहीं बनते हैं जैसे कि **ई० कोलाई, साल्मोनिला, शिगिला** आदि। जीवाणुओं की दूसरी अवस्था वह है जिसमें जीवाणुओं में अनुपयुक्त वातावरण में बीजाणु बनते हैं जैसे कि **क्लास्ट्रिडियम, एंथ्रेक्स, टेटेनस** के जीवाणु। बीजाणु जनक जीवाणु हनन- प्रक्रिया तथा रसायनों से जल्दी नहीं मरते हैं। इसलिए जीवाणु हनन करने वाले रसायनों की उपयुक्तता तभी मानी जाती है जब वे बीजाणु- जनक जीवाणुओं को आसानी से नष्ट कर सकें।

जीवाणु- हनन के विषय में विस्तार से समझने से पूर्व उनसे संबंधित कुछ पारिभाषिक शब्दों के विषय में जानना आवश्यक है।

स्टेरिलाइजेशन (Sterilization) (निर्जर्मीकरण) : निर्जर्मीकरण जीवाणु- हनन की वह प्रक्रिया है जिसके द्वारा किसी पदार्थ या वस्तु पर उपस्थित जीवाणुओं के विभिन्न प्रकार एवं उनकी सब अवस्थाएं बिल्कुल नष्ट हो जाती है।

डिसइनफेक्शन (Disinfection) (विसंक्रमण) : यह जीवाणु हनन की वह प्रक्रिया है जिसमें हर प्रकार के बीजाणु रहित जीवाणु लगभग नष्ट हो जाते हैं। परन्तु बीजाणुयुक्त जीवाणु एवं विषाणु इस प्रक्रिया से बच सकते हैं। विसंक्रामक पदार्थ मुख्यतः रसायन होते हैं जो यदि किसी वस्तु पर लगाये जायें तो जीवाणु की वृद्धि रोक देते हैं या उनकी संख्या घटा देते हैं परन्तु पूर्ण निर्जर्मीकरण नहीं होता।

एंटीसेप्सिस (Antisepsis) (रोगाणुरोधक) : इस प्रक्रिया में ऐसे रसायनों का उपयोग होता है जो कि विसंक्रमण के लिए त्वचा या श्लेष्मिक झिल्लियों पर लगाये जा सकते हैं।

ये विसंक्रामक पदार्थों की तुलना में कम ही तनुता के प्रयुक्त होते हैं ।

जर्मीसाइड (Germicide) (जर्मनाशी) : ऐसे रसायन हैं जो कि बीजाणु रहित जीवाणु को तो मार देते हैं परन्तु बीजाणुयुक्त जीवाणुओं पर इनका प्रभाव नहीं होता । ऐसे रसायन जो कि बीजाणुओं को मारते हैं बीजाणुनाशक (स्पोरीसाइड, Sporicide) कहलाते हैं । जो कवकों को मारने में समर्थ हैं उन्हें कवकनाशी (फंगीसाइड, Fungicide) तथा जो विषाणुओं को मारने में सक्षम हैं उन्हें विषाणुनाशी (वाइरूसाइड, Virucide) रसायन कहते हैं ।

बैक्टीरियोस्टेसिस (जीवाणु निरोध, Bacteriostasis) : यह एक परिस्थिति है जिसमें जीवाणुओं की वृद्धि और गुणन दब जाते हैं परन्तु जीवाणु मरते नहीं हैं। यदि जीवाणु- निरोधी पदार्थ को हटा लिया जाये तो जीवाणु की वृद्धि एवं गुणन फिर शुरू हो जाता है ।

एसेप्सिस (Asepsis) (अपूती) : किसी स्थान या पदार्थ से रोगजनक जीवाणु की अनुपस्थिति अपूति अवस्था कहलाती है । अपूतिक विधियाँ रोगजनक जीवाणुओं को शरीर में घुसने से रोकती हैं ।

सैनिटाइजेशन (Sanitization) (स्वच्छीकरण) : किसी पदार्थ या स्थान से यांत्रिक या रासायनिक विधि से रोगजनक जीवाणुओं की संख्या इतनी कम कर देना कि स्वास्थ्य की दृष्टि से सुरक्षित हो जायें । इस प्रक्रिया को स्वच्छीकरण कहते हैं ।

जीवाणु-हनन की विधियाँ

भौतिक विधियाँ

1. **ऊष्मा से जीवाणु हनन** : यह जीवाणु हनन की विधि हमारे दैनिक जीवन में सबसे ज्यादा प्रयुक्त की जाती है,ऊष्मा का प्रयोग जीवाणु हनन के लिये कई प्रकार से किया जाता है ।

(क) **आर्द्र ऊष्मा (Moist Heat)** : यह उबलते पानी के रूप में प्रयोग की जाती है। उबलते पानी का ताप लगभग $100^{0}C$ होता है तथा इस ताप पर अबीजाणुक रोगकारी जीवाणु लगभग 10 मिनट में नष्ट हो जाते हैं। बीजाणुक जीवाणु तथा विषाणु इस ताप पर नष्ट नहीं होते। हेपेटाइटिस रोग उत्पन्न करने वाले विषाणु उबलते पानी में 30 मिनट तक जीवित रह सकते हैं जबकि बीजाणुयुक्त जीवाणु उबलते पानी के ताप को 20 घंटे तक सहन कर सकते हैं। वैसे पानी या भोजन को कुछ मिनट तक उबाला जाए तो उसमें उपस्थित लगभग सभी रोगकारी जीवाणु नष्ट हो जाते हैं। दैनिक जीवन में उबलते पानी का उपयोग मरीजों के कपड़ों को उबालकर उनमें उपस्थित रोगकारी जीवाणुओं को नष्ट करने तथा अस्पतालों में इंजेक्शन लगाने वाली सिरिंज, सुई तथा कैंची आदि को जीवाणु रहित करने के लिए किया जाता है।

(ख) **दाब पर ऊष्मा** : इस विधि में ऊष्मा का उपयोग दाब पर किया जाता है। यह पाया गया है कि यदि पानी के उबलने पर दाब बढ़ाया जाए तो पानी के उबलने का ताप बढ़ जाता है। 15 पौंड दाब पर पानी के उबलने का ताप $100^{0}C$ से बढ़ कर $121^{0}C$ हो जाता है। इस ताप पर जीवाणु के अबीजाणुक एवं बीजाणुक के सभी प्रकार, 15 मिनट के अंदर नष्ट हो जाते हैं। इस सिद्धान्त पर ही आधारित निर्जर्मीकरण यंत्र जैसे आटोक्लेव और प्रेशर कुकर बने हैं। इस विधि से जीवाणु की वृद्धि के लिए संवर्ध (Media) पदार्थों का निर्जर्मीकरण किया जाता है। यह विधि प्रयोगशालाओं में बहुत उपयोगी पायी गयी है तथा प्रेशर कुकर का उपयोग हमारे दैनिक जीवन में बहुत ही अधिक बढ़ गया है।

(ग) **शुष्क ऊष्मा से जीवाणु- हनन** : इस विधि में संदूषित पदार्थ, जैसे मलमूत्र, रक्त आदि को सीधे जला दिया जाता है जिससे इन पदार्थों से संक्रमण फैलने

का उद्गम ही खत्म हो जाए। मृत्युपरांत शव का निस्तारण भी जलाकर ही किया जाता है। यह विधि हमारे देश में सदियों से चल रही है और अब विश्व में जगह-जगह शवदाह- गृह बनाये जा रहे हैं। अगर शव में रोगाणु भरे हों तो वे शव के साथ जल कर हमेशा-हमेशा के लिए नष्ट हो जाते हैं।

प्रयोगशालाओं में शीशे का सामान, जैसे सिरिंज, फ्लास्क, पेट्रीडिश आदि की निर्जर्मीकरण शुष्क ऊष्मा का प्रयोग करके और उनको हाट- एअर ओवेन में रखकर किया जाता है जिसमें इन सामानों को निर्जर्मीकरण करने के लिए $170^{0}C$ पर दो घंटे रखा जाता है। इस उपचार से सब प्रकार के जीवाणु (बीजाणुक और अबीजाणुक) विषाणु आदि बिल्कुल नष्ट हो जाते हैं तथा वह सामान या पदार्थ निर्जर्मीकृत हो जाता है।

2. **पास्चुरीकरण (Pasteurisation)** : लुई पास्चर ने बहुत समय पूर्व शराब, बीयर में सड़न रोकने के लिए एक विधि विकसित की थी जिसमें उन्होंने इन पदार्थों को हलके से गरम करने की संस्तुति की। उन्होंने यह पाया कि इस विधि से वे सब जीवाणु नष्ट हो गये जो शराब और बीयर में सड़न उत्पन्न कर रहे थे। उनकी इस विधि का नाम पास्चुरीकरण हो गया है तथा इसका उपयोग दूध, फलों का रस तथा मक्खन आदि के पास्चुरीकरण के लिए किया जाता है। इसकी दो विधियाँ हैं। पहली विधि में पदार्थ को $65^{0}C$ पर 30 मिनट तक रखते हैं जबकि दूसरी विधि में जिसे एच० टी० एस० टी० भी कहते हैं, पदार्थ को $72^{0}C$ पर 15 सैकेण्ड के लिए रखते हैं। इससे दूध में जीवाणु की संख्या घट जाती है और दूध जल्दी खराब नहीं होता। इस उपचार से कुछ रोगों (जैसे ब्रुसेला, टी० बी०, क्यूफीवर) के रोगाणु भी मर जाते हैं जिससे दूध स्वास्थ्यकर बन जाता है।

3. **आयनीकरण विकिरण विधि से जीवाणु हनन** : विकिरण विधि से भोज्य पदार्थों

में जीवाणु हनन का उपयोग बढ़ता चला जा रहा है। इस विधि में सूक्ष्म जीवों के अलावा छोटे छोटे अन्य कीड़े- मकोड़े तथा सूअर के मांस से होने वाले भयानक रोग ट्रिकनोसिस के कारक भी नष्ट हो जाते हैं। आजकल कुछ दवाओं के एवं चिकित्सा में प्रयुक्त होने वाले सिरींज, प्लास्टिक पदार्थों, दस्तानों तथा शल्य चिकित्सा में प्रयुक्त होने वाले धागों आदि के निर्जर्मीकरण करने के लिए आयनीकरण विकिरण का उपयोग किया जाता है।

आयनीकरण विकिरण के अंतर्गत यू० वी० (UV) किरणें आती हैं। इनका उपयोग जीवाणु हनन के लिए किया जा रहा है। यू० वी० किरणें, जिनका तरंग दैर्ध्य 360 नैनोमीटर होता है, जीवाणुओं को नष्ट करने में बहुत ही सक्षम होती हैं। आजकल अस्पतालों एवं प्रयोगशालाओं के कमरों को जीवाणु रहित करने के लिए यू० वी० लाइट का उपयोग अत्यधिक तेजी से हो रहा है। सूर्य प्रकाश में भी यू० वी० किरणें होती हैं जो सूर्य के प्रकाश की जीवाणुनाशन क्षमता के लिए उत्तरदायी होती है।

रासायनिक विधि से जीवाणु हनन

फीनॉल शायद वह प्रथम रसायन है जिसका उपयोग डा० लिस्टर ने एंटीसेप्टिक सर्जरी में किया था, परन्तु इसका उपयोग इसकी महक और त्वचा पर जलन पैदा करने के कारण कम होता जा रहा है। एंटीसेप्टिक के रूप में इसका 1% घोल संक्रमित चाकू, कैंची आदि के धोने के तथा संक्रमित हाथ के धोने में उपयोगी पाया गया है। संक्रमित थूक, पस, मल, मूत्र, रक्त आदि को फीनॉल से विसंक्रमित करने के लिए फीनॉल का 1:20 घोल बहुत उपयोगी पाया गया है। फीनॉल से भी सुधरे कई अन्य रसायन जैसे क्रिओजाल, लाइसोल बन चुके हैं जिनका उपयोग जीवाणु हनन के लिए खूब किया जाता है। अस्पतालों में एवं घरों में विसंक्रमण के लिए 3 से 5% फीनॉल पदार्थों का घोल रोगी के कमरों के लिए बहुत उपयोगी पाया गया है। फीनॉल का 1:20 घोल रोगी के लिए

प्रयुक्त होने वाले थर्मामीटर को रखने के लिए उपयोगी पाया गया है ।

ब्लीचिंग पाउडर (Bleaching Powder) : इसका उपयोग दैनिक जीवन में बहुत अधिक होता है । पीने के पानी में रोगाणुओं को मारने के लिए इस रसायन का उपयोग बहुत समय से हो रहा है । पानी के संसर्ग में आते ही ब्लीचिंग पाउडर से "नवजात क्लोरीन" एवं "आक्सीजन" निकलती है जो पानी में उपस्थिल जीवाणुओं एवं अन्य रोगाणुओं को मारने में सक्षम होती है । घरों में पीने के पानी को जीवाणु रहित करने के लिए ब्लीचिंग पाउडर का एक संचित घोल (3.42 ग्राम, ब्लीचिंग पाउडर 500 मिलीलिटर पानी में मिलाकर) बना सकते हैं । जब पीने के पानी में जीवाणुओं को मारना हो तो इस संचित घोल की 90 बूंद 10 लीटर पानी में मिला दें और 30 मिनट तक रसायन को कार्य करने दें । इसका उपयोग कॉलरा, अतिसार, टायफाइड आदि जैसे रोग के फैलने पर घरों में स्वास्थ्य रक्षा के लिए करना चाहिए । इसके अतिरिक्त यदि कहीं बदबू फ़ैली हो तो ब्लीचिंग पाउडर का सूखे पाउडर के रूप में वहां उपयोग करना चाहिए । यह बदबू नष्ट कर देता है जैसे कि नालियों में रोगी विसर्जित मल- मूत्र, कफ आदि में उपस्थित रोगाणुओं को मारने के लिए ब्लीचिंग पाउडर का उपयोग बहुत ही लाभकारी पाया गया है ।

चूना : यह सबसे सस्ता विसंक्रामक पदार्थ है । चूने के घोल से प्रतिवर्ष घरों में पुताई कराने से दीवारों एवं अन्य जगहों पर जहां जीवाणु मौजूद होते हैं, चूने के कारण नष्ट हो जाते हैं । चूने पाउडर का प्रयोग रोगी मनुष्य के मल, मूत्र, कफ आदि में उपस्थित जीवाणुओं को भी नष्ट करने के लिए किया जाता है ।

पोटेशियम परमैगनेट (लाल दवा) : यह रसायन भी जीवाणु हनन के लिए प्रयुक्त होता है । जब कॉलरा, फैला हो तो कुओं का पानी इससे उपचारित किया जाता है । इसके लिए लगभग 120 ग्राम लाल दवा एक बाल्टी पानी में घोल कर कुंए में डाल देते हैं और 8 घंटे तक कुंए के पानी को ऐसे ही रहने देते हैं । जब टायफायड या गेस्ट्रोइंटेराइटिस का रोग

फैला हो तो साग, सब्जी, फल आदि को घर में लाल दवा के घोल (1:1000) से धोकर खाना चाहिए।

दैनिक जीवन में प्रतिदिन काम आने वाले कुछ रोगाणुरोधक (Antiseptic) पदार्थ

(क) एक्रीफ्लेविन (पीली दवा) : इसका घोल (1:1000) भरते हुए घाव को धोने तथा उस पर लगाने के लिए बहुत ही अच्छा रोगाणुरोधक पदार्थ माना गया है।

(ख) डेटॉल : यह एक बहुत ही अच्छा रोगाणुरोधक रसायन है। इसके 1% घोल को शरीर के कहीं भी कट जाने पर उसे तुरन्त धोने के लिए उपयोग किया जाता है। दाढ़ी बनाने के बाद 1% घोल लगाने पर कभी फोड़े, फुंसी उस जगह उत्पन्न नहीं होते।

(ग) क्रिस्टल वायलेट (बैंगनी रंग) : इसका 1% घोल शरीर में कहीं जल जाने पर पके घाव पर, कवक रोग पर किसी पुराने घाव पर लगाने के लिए बहुत उपयोगी पाया गया है।

(घ) टिंक्चर आयोडीन : यह घाव पर लगाने के लिए बहुत ही अच्छी रोगाणुरोधक दवा मानी जाती है। इसको घर में आसानी से बनाया जा सकता है। 100 मिलीलीटर अल्कोहल (50% तनुता का) में 2.35 ग्राम सोडियम आयोडाइड तथा 2 ग्राम आयोडीन मिलाकर एक भूरे रंग की शीशी में रख लें।

(ङ) आँख धोने के लिए बोरिक एसिड का घोल : 3.4 ग्राम बोरिक एसिड उबालकर ठंडा किये 100 मिलीलीटर पानी में मिलायें। आँखें दुखने पर एक भाग बोरिक एसिड का घोल तथा एक भाग उबला ठंडा पानी मिलाकर उससे आँखें धोने के लिए बहुत उपयोगी पाया गया है।

(च) **खून बहने को रोकने के लिए :** कहीं चोट लग जाने पर या कट जाने पर यदि खून बहना शुरू हो जाए तो एक दवा मार्केट में दवा की दुकान पर मिलती है जिसे "टिंक्चर बेंजेइन को" कहते हैं, किसी गाज क्लाथ या जरा सी साफ रूई पर लगाकर घाव पर लगा देना चाहिए यह अपने आप चिपक जायेगा और कुछ मिनटों में खून का निकलना बंद कर देता है। यह रोगाणुरोधक भी है जिससे घाव पकेगा भी नहीं परन्तु इस पर पानी नहीं पड़ना चाहिए।

(छ) **एंटीबायोटिक क्रीम :** छोटे- छोटे घावों तथा आंख में लाली एवं सूजन होने पर एंटीबायोटिक क्रीम का उपयोग लाभकारी पाया गया है। मार्केट में मिलने वाले कुछ एंटीबायोटिक का नाम है पेनिसिलिन आई आयंटमेंट, टेरामाइसिन आयंटमेंट, क्लोरोमाइसिटीन आयंटमेंट आदि।

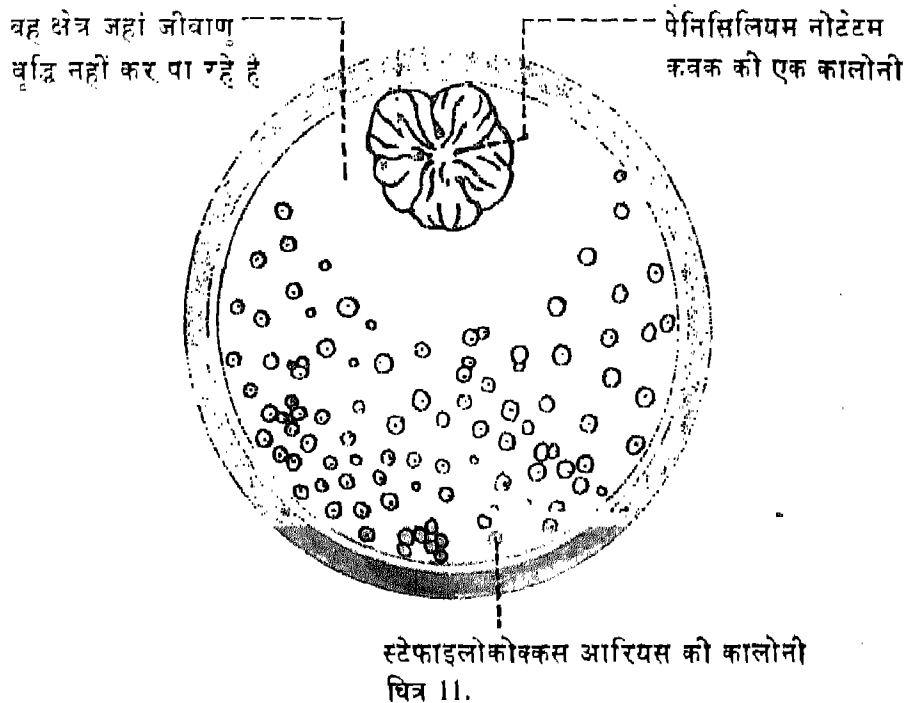
अध्याय 6

जीवाणु जनित एंटीबायोटिक और अन्य औषधियाँ - रोगों के उपचार में

हम देखते हैं कि ज्यों ही बच्चे को बुखार आता है उसके माता- पिता तुरंत उसे डाक्टर के पास ले जाते हैं। डाक्टर बच्चे का बुखार नापकर उसके फेफड़ों और दिल की जांच करता है। रोग के विषय में विस्तार से पूछताछ करता है, उसके सम्भावित कारणों की जानकारी प्राप्त करता है जैसे वह जानना चाहता है कि बुखार ठंड से तो नहीं आया। गले में खराश तो नहीं है ? खांसी तो नहीं आती है ? पूर्ण जानकारी के बाद कभी-कभी वह पानी में उबाली सिरींज और सुई लेकर उसमें दवाई भरकर बच्चे की बांह पर लगा देता है। ऐसा क्यों ? यह दवा क्या थी ? यह दवा एंटीबायोटिक थी जो कि शरीर के अन्दर जीवाणुओं को नष्ट करने के लिए सुई द्वारा पहुंचाई गई।

एंटीबायोटिक वे रासायनिक पदार्थ हैं जो कि जीवाणुओं से उत्पन्न होते हैं और उनकी बहुत ही कम मात्रा जीवाणुओं को मारने में सक्षम होती हैं। सन् 1929 में अलेक्जेंडर फ्लेमिंग ने देखा कि **संवर्ध** (Culture) की एक प्लेट में जिसमें **स्टेफाइलोकोक्काई आरियस** नामक जीवाणु संवर्धन के लिए डाला गया था, की वृद्धि एक कवक (Fungi) की कालोनी

के पास चारों तरफ नहीं हो पायी, जबकि अन्य जगह पर जीवाणु ने अच्छी तरह से वृद्धि कर ली थी। उन्होंने इस पर अपना यह मत प्रकट किया कि कवक जो कि **पेनिसिलियम नोटेटेम** था, एक ऐसा पदार्थ बना रहा था जो कि **स्टेफाइलोकोक्काई आरियस** नामक जीवाणु को मार रहा था (चित्र 11)। उनके इस अनुसंधान का उपयोग द्वितीय विश्व युद्ध में घाव में "पस" पड़ने के कारण मरने वाले फौजियों की जीवन रक्षा के लिए किया गया। आक्सफोर्ड विश्वविद्यालय के लोरी और चेन नामक वैज्ञानिकों ने उपर्युक्त कवक से "पेनिसिलिन" नामक पदार्थ शुद्ध रूप से विलगित किया और औषधि के रूप में इसका उपयोग फौजियों पर किया। इसके बाद पेनिसिलीन का उपयोग विश्वभर में महत्वपूर्ण

चित्र 11.

बीमारियों की रोकथाम के लिए किया जाने लगा। यही नहीं उसके बाद पेनिसिलिन जैसे एंटीबायोटिक की खोज में बाढ़ आ गयी और आज हम एंटीबायोटिक के युग में इन जीवाणुजनित रोगों से निडर होकर घूम रहे हैं। पहले प्लेग, हैजा, टायफाइड और टी० बी० जैसे रोग असाध्य माने जाते थे और बीमार मनुष्य जीने की आशा छोड़ देता था। परन्तु आज ये बीमारियां असाध्य नहीं हैं एंटीबायोटिक के प्रयोग से ठीक हो जाती हैं। अब मानव इन रोगों का नाम भी भूलता जा रहा है। आज तक कई हजार एंटीबायोटिकों का पता लग चुका है परन्तु हम दैनिक जीवन में इनमें से कुछ का ही उपयोग अधिकता से करते रहे हैं। नीचे एक तालिका दी जा रही है जिसमें विभिन्न जीवाणुओं से उत्पन्न किये जाने वाले एंटीबायोटिक के नाम दिये गये हैं (तालिका 6.1)।

तालिका 6.1

विभिन्न जीवाणुओं द्वारा उत्पन्न किये जाने वाले एंटीबायोटिक

जीवाणु	एंटीबायोटिक
बैसिलस सटलिस	बेसिट्रेसिन
बैसिलस पालीमिक्सा	पालीमिक्सिन
स्ट्रेप्टोमाइसीज पर्ववुलस	एक्टीनोमाइसिन डी
स्ट्रेप्टोमाइसीज नोडोडस	फुगीजोन
स्ट्रेप्टोमाइसीज वेनीजुएली	क्लोरमफेनिकाल
स्ट्रेप्टोमाइसीज आरिओफेसीअंस	क्लोरटेट्रासाइक्लीन (आरियोमाइसिन) टेट्रासाइक्लीन

स्ट्रेप्टोमाइसीज इरीथ्रस	इरीथ्रोमाइसिन
स्ट्रेप्टोमाइसीज केनामाइसिटिकस	केनामाइसिन
स्ट्रेप्टोमाइसीज फ्रेडी	नियोमाइसिन
स्ट्रेप्टोमाइसीज नोरसी	निस्टेटिन (माइकोस्टेटिन)
स्ट्रेप्टोमाइसीज रिमोसस	आक्सीटेट्रासाइक्लीन (टेरामाइसिन)
स्ट्रेप्टोमाइसीज ग्रिसीयस	स्ट्रेप्टोमाइसिन
माइक्रोमोनोस्पोरा परप्यूरी	जेंटामाइसिन
सिफैलोस्पोरियम (कवक)	सिफैलोस्पोरिन
पेनिसिलियम ग्रीसोफुलवम (कवक)	ग्रीसोफुलविन
पेनिसिलियम नोटेटेम (कवक)	पेनिसिलीन

दैनिक जीवन में काम आने वाले कुछ एंटीबायोटिक का संक्षिप्त विवरण

1. **पेनिसिलीन** : पेनिसिलीन का उपयोग घाव में पस बनाने वाले **स्टेफाइलोकोक्काई** नामक जीवाणु की शरीर में वृद्धि रोकने के लिए किया जाता है। इसका उपयोग अन्य गोलाकार जीवाणु जैसे **स्ट्रेप्टोकोक्काई** और **निसीरिया** जो कि न्यूमोनिया और गोनेरिया जैसे रोग उत्पन्न करते हैं, को रोकने के लिए भी किया जाता है । यह एंटीबायोटिक उन कुछ एंटीबायोटिकों में से एक है जिसका सबसे ज्यादा उपयोग बीमारियों की रोकथाम के लिए किया जाता है । पिछले कुछ दशकों में यह पता चला है कि स्ट्रेफाइलोकोक्काई एवं स्ट्रेप्टोकोक्काई की कुछ जातियाँ इस दवा की प्रतिरोधी (Drug Resistant) बन गयी हैं। ये जीवाणु "पेनिसिलीनेज" नामक एक एंजाइम बनाते हैं जो कि पेनिसिलीन के "आधारभूत केन्द्रक" को तोड़कर पेनिसिलीन को नष्ट कर

पेनिसिलिन का केन्द्रक भाग

पेनिसिलीन "जी"

एम्पीसिलीन

मेथिसिलीन

स्ट्रेप्टोमाइसिन

क्लोरमफेनिकाल

चित्र 12.

देते हैं। इस प्रकार पेनिसिलीन अवरोधी जीवाणुओं पर पेनिसिलीन का प्रभाव नहीं पड़ता साथ में यह भी पाया गया है कि बहुत से मनुष्यों में पेनिसिलीन के प्रति "एलर्जी" उत्पन्न होने लगती है और इस "एलर्जी" (Allergy) का प्रभाव इतना तीव्र उठता है कि रोगी की मृत्यु भी हो जाती है। इसको देखते हुए बहुत से देशों ने तो पेनिसिलीन के उपयोग पर रोक लगा दी है परन्तु विकसित देशों में अब भी इसका उपयोग हो रहा है। पेनिसिलीन के तरह की ही कुछ आज संश्लेषित औषधियाँ उपलब्ध हैं (चित्र 12) जैसे पेनिसिलीन अवरोधी जीवाणुओं को मारने के लिए "मेथिसिलीन" (एक प्रकार की पेनिसिलीन) का उपयोग हो रहा है। इसी तरह "ऐम्पीसिलीन" नामक पेनिसिलीन, कोकाई के अलावा अन्य प्रकार के जीवाणुओं को भी मारने में सक्षम है।

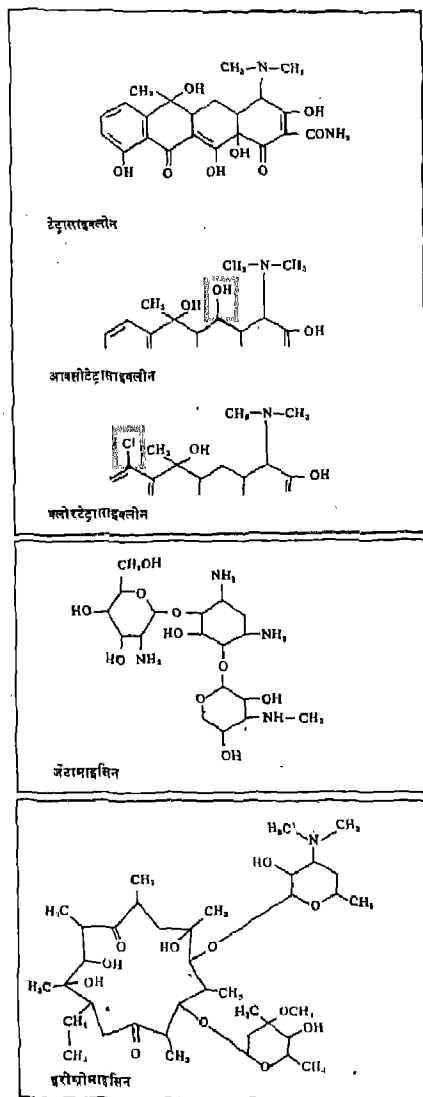
2. **स्ट्रेप्टोमाइसिन** : स्ट्रेप्टोमाइसिन ग्रीसस जीवाणुओं से तैयार किये जाने वाले स्ट्रेप्टोमाइसिन नामक एंटीबायोटिक का उपयोग टी० बी० जैसे भयानक रोग के उपचार के लिए किया जाता है। वैसे तो "स्ट्रेप्टोमाइसिन" (चित्र 12) एक अहानिकर पदार्थ है परन्तु यदि इसका उपयोग काफी समय तक किया जाए तो आठवीं मस्तिष्क नाड़ी को नुक्सान पहुंचता है तथा इसकी वजह से रोगी में बहरापन उत्पन्न हो सकता है।
3. **क्लोरमफेनिकाल (क्लोरोमाइसिटीन)** : यही ऐसा एंटीबायोटिक है (चित्र 12) जो कि बहुत प्रकार के जीवाणुओं को शरीर के अंदर नष्ट करने की क्षमता रखता है। इसका मुख्य उपयोग टायफाइड जैसे रोगों के उपचार में किया जाता है। परन्तु लम्बे समय तक उपचार में प्रयुक्त होने पर क्लोरमफेनिकाल किसी-किसी रोगी में रक्त कोशिकाओं के उत्पादन (प्लास्टिक एनीमिया) को प्रभावित करता है।
4. **टेट्रासाइक्लीन** : क्लोरटेट्रासाइक्लीन, आक्सीटेट्रासाइक्लीन तथा टेट्रासाइक्लीन के

टेट्रासाइक्लीन

आक्सीटेट्रासाइक्लीन

क्लोरटेट्रासाइक्लीन

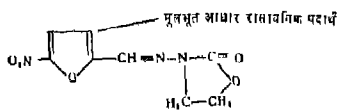
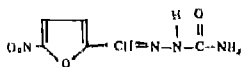
जेंटामाइसिन

इरीथ्रोमाइसिन

चित्र 12. अ

संगठन का मूल आधार एक-सा है और रासायनिक एवं शारीरिक प्रभाव में भी लगभग वे एक से हैं। इन तीनों का रासायनिक संगठन चित्र 12 अ में दर्शाया गया है। ये तीनों एंटीबायोटिक कई प्रकार के जीवाणुओं को मारने में सक्षम हैं। अंतड़ियों की सामान्य बीमारियों, बुखार, फेफड़े के सामान्य जीवाणुक - रोगों को रोकने में टेट्रासाइक्लीन बहुत उपयोगी पाया गया है। यह भी देखा गया है कि इसके बहुत अधिक उपयोग से जीवाणु इसके प्रभाव के प्रति अवरोधी हो जाते हैं।

5. **जेंटामाइसिन** : जेंटामाइसिन (चित्र 12 अ) आम रोगों के उपचार के लिए बहुत ही उपयोगी पाया गया है। साथ में यह भी देखा गया है कि शरीर में स्यूडोमोनास एरूजिनोसा नामक जीवाणु से उत्पन्न रोगों के उपचार के लिए जेंटामाइसिन बहुत ही महत्वपूर्ण एंटीबायोटिक है।
6. **इरीथ्रोमाइसिन** : स्ट्रेप्टोकोक्कल और स्टेफाइलोकोक्कल जीवाणुओं द्वारा उत्पन्न रोगों के उपचार के लिए इरीथ्रोमाइसिन का उपयोग पेनिसिलीन से भी ज्यादा किया जाने लगा है। गोनोरिया जैसे रोगों के उपचार के लिए अब इरीथ्रोमाइसिन का उपयोग सर्वाधिक होता है। यह देखा गया है कि माइकोप्लाज्मल न्यूमोनिया के उपचार के लिए इससे अच्छी दवा नहीं है। इरीथ्रोमाइसिन को मुंह से लिया जाता है तथा इंजेक्शन की जरूरत नहीं होती।

कुछ अन्य संश्लेषित औषधियां (जो जीवाणुओं से नहीं बनाई जाती)

नाईट्रोफुरान : जीवाणु हनन के लिए इस औषधि का उपयोग बहुत किया जाता है। इस औषधि के कई प्रकार हैं (चित्र 13) परन्तु इनका मुलभूत रासायनिक आधार "फरप्यूरल" नामक पदार्थ है। "फरप्यूरल" पदार्थ एवं अन्य रासायनिक समूहों को इसके 1000 से ज्यादा पदार्थ जोड़कर बनाये जा चुके हैं। इसके तीन मुख्य प्रकार- फूराजोलिडोन, नाइट्रोफुराजोन और नाइट्रोफुरनट्वाइन का उपयोग औषधि के क्षेत्र में मूत्र संस्थान के

मूलभूत आधार रासायनिक पदार्थ

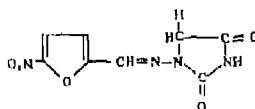
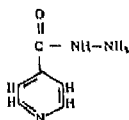
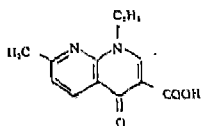
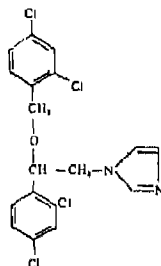
फुराजोलिडोन (फुरोआक्सोन)

नाइट्रोफराजोन (फुरासिन)

नाइट्रोफुरनट्वाइन (फुराडेंटिन)

आइसोनियेजाइड (आई. एच. एन.)

नेलिडिक्सिक एसिड

माइकोनेजोल (डक्टरिन का आधार)

चित्र 13.

संक्रमण को रोकने के लिए किया जाता है। यही नहीं इन पदार्थों का उपयोग कवकों द्वारा त्वचा के रोगों को रोकने, प्रोटोजुआ से होने वाले रोगों को रोकने एवं आंत्र रोगों को रोकने में भी बहुतायत से किया जाता है।

आइसोनियेजाइड : यह संश्लेषित पदार्थ मनुष्यों में टी० बी० रोग को रोकने में बहुत अधिक उपयोग में लाया जाता है (चित्र 13)। इसका उपयोग टी० बी० उपचार में स्ट्रेप्टोमाइसिन नामक एंटीबायोटिक के साथ बहुत ही लाभकारी सिद्ध हुआ है। टी० बी० से बचाव के लिए इसका बहुत उपयोग किया जाता है।

नैलिडिक्सिक एसिड : यह नव- संश्लेषित पदार्थ मूत्र- संस्थान में संक्रमण रोकने के लिए बहुत लाभकारी पाया गया है (चित्र 13)। यह जीवाणुओं का हनन, उनमें उपस्थित न्यूक्लीइक अम्ल के बनने को रोक कर करता है। इसका अधिक उपयोग स्वास्थ्य के लिए हानिकर हो सकता है।

अध्याय 7

जीवाणु एवं विषाणु जनित रोगों की रोकथाम के लिए टीके (वैक्सीन)

आजकल रेडियो एवं टैलीविजन में बार बार यह सुनने में आता है कि क्या आपने अपने बच्चों को पोलियो, टेटनस और काली खाँसी का टीका लगवाया है ? नहीं लगवाया है तो नजदीक के अस्पताल में जाकर फौरन लगवायें। न लगवाने पर आपका शिशु पोलियो, टेटनस और काली खाँसी का शिकार हो सकता है और मृत्यु भी हो सकती है। यह टीका क्या है ? आइये इस विषय पर हम यहां बात करते हैं।

जेनर ने मनुष्यों में चेचक रोग को नियंत्रित करने के लिए प्रथम बार सन् 1796 में इसके प्रति टीका विकसित किया। उन्होंने मनुष्यों के इस विषाणु जनित रोग के लिए टीका बनाने के लिए गाय के चेचक रोग के विषाणुओं का उपयोग किया। इसके पीछे मूल सिद्धांत यह था कि गाय में चेचक रोग उत्पन्न करने वाले विषाणु मनुष्यों में चेचक रोग उत्पन्न करने में सक्षम नहीं होते परन्तु यदि उन्हें (गाय के चेचक रोग के विषाणुओं को) मनुष्यों में अंत:क्षेपित किया जाए तो वे मनुष्यों में चेचक रोग के प्रति इतनी रोग- रोधक- क्षमता (प्रतिरक्षा Immunity) बढ़ा देते हैं कि टीके लगे मनुष्य में चेचक रोग उत्पन्न नहीं हो

सकता है। कुछ इन्हीं सिद्धांतों का उपयोग करके श्री पाश्चर ने 1885 में कुत्ते के भयानक रोग "रैबीज" के प्रति टीका बनाकर इस भयानक बीमारी से मनुष्यों की रक्षा की। उन्होंने कुत्ते के रैबीज विषाणु को, जो कि मनुष्यों में रोग उत्पन्न करने में सक्षम हैं, खरगोशों के मस्तिष्क में कई बार स्थानान्तरित करके विषाणु को इतना दुर्बल (Attenuate) बना दिया कि "परिवर्तित विषाणु" जिसे "फिक्स्ड वाइरस" भी कहते हैं, मनुष्यों में रोग उत्पन्न करने में तो सक्षम न रहे परन्तु रैबीज के प्रति प्रतिरक्षा उत्पन्न करने की क्षमता उनमें बनी रही। पाश्चर ने इस "परिवर्तित विषाणु" का उपयोग टीके के रूप में किया। आज विभिन्न बीमारियों के कारकों को दुर्बल बनाकर या उन्हें रसायनों से मारकर या फिर उनके उत्पादों को टीके के रूप में मूलतः प्रयोग में लाते हैं।

वैक्सीन (टीका) एक ऐसा जैविक पदार्थ है जिसमें किसी रोग को उत्पन्न करने वाले जीवाणु या विषाणु (अजीवित या परिवर्तित रूप में) या उनके उत्पाद उपस्थित रहते हैं। यदि इन्हीं टीकों को शरीर में अंतःक्षेपित कर दिया जाए तो ये परपोषी में उस रोग के प्रति इस स्तर की प्रतिरक्षा उत्पन्न कर देते हैं कि परपोषी इस रोग के प्रति एक निश्चित समय तक अवरोधी बना रहता है। वैक्सीन में उपस्थित जीवाणु या विषाणु या तो बहुत अधिक दुर्बल बना दिये जाते हैं या उनमें इस प्रकार का परिवर्तन कर दिया जाता है कि वे रोग उत्पन्न करने में सक्षम नहीं होते। परन्तु इस परिवर्तन के बावजूद वे बदले कारक शरीर की प्रतिरक्षा प्रणाली को प्रेरित करने में सक्षम होते हैं। ऐसा पाया गया है कि दुर्बल और अरोगजनक जीवित विषाणु शरीर की प्रतिरक्षा प्रणाली को मरे हुए विषाणु की तुलना में ज्यादा समय तक उत्प्रेरित करते हैं। परन्तु जीवित विषाणु टीके के रूप में नुक्सान भी कर सकते हैं। टायफाइड फीवर के वैक्सीन में **साल्मोनिल्ला टाइफी** नामक जीवाणु मृत अवस्था में उपस्थित रहता है। पोलियो के लिए साल्क द्वारा बनायी गयी वैक्सीन में पोलियो के विषाणु मृत अवस्था में रहते हैं और यह वैक्सीन बच्चों को मुंह के द्वारा पोलियो ड्राप

पोलियो के लिए
(ओरल टीके की तृतीय खुराक)
डी. पी. टी. (द्वितीय खुराक)
बी. सी. जी. का टीका
(यदि 0-1 माह में न लगा हो)
पोलियो के लिए (बूस्टर खुराक)
माता रोग के लिए
(द्वितीय टीका यदि
0-1 माह में लगा हो)
5 माह तक
1 वर्ष तक
डी. पी. टी. का टीका (बूस्टर खुराक)
पोलियो का टीका
(बूस्टर खुराक)
पोलियो के लिए
(ओरल टीके की द्वितीय खुराक)
4 माह तक
3 वर्ष तक
डी. पी. टी. का टीका
पोलियो के लिए
(ओरल टीके की प्रथम खुराक)
माता रोग का टीका
(यदि 0-1 माह में न लगा हो)
3 माह तक
3-6 वर्ष तक
टायफाइड का टीका (एक खुराक)
टेटनस टाक्साइड का बूस्टर डोज
बी. सी. जी. टीका (द्वितीय टीका)
माता रोग का टीका
0-1 माह तक
11-12 वर्ष तक
माता रोग का टीका
टी. बी. रोग के लिए बी. सी. जी. का टीका
माता रोग का टीका
टेटनस टाक्साइड
(बूस्टर डोज)
टायफाइड वैक्सीन (मिश्रित)

चित्र 14.

के रूप में दी जाती है। पीत- ज्वर के विषाणु मुर्गी के अंडों में स्थानान्तरित करके दुर्बल बनाये जाते हैं और फिर इसका उपयोग वैक्सीन के रूप में होता है। कुछ टीकों के नाम जो मनुष्यों में प्रयुक्त होते हैं, इस प्रकार हैं :

1. डी० पी० टी० — डिफ्थीरिया, परट्यूसिस (काली खाँसी), टिटेनस वैक्सीन
2. डी० टी० — डिफ्थीरिया, टेटेनस वैक्सीन
3. डी० पी० — डिफ्थीरिया, परट्यूसिस वैक्सीन
4. टी० ए० बी० — टायफाइड- पैरा ए और बी
5. बी० सी० जी० — टी० बी० के लिए वैक्सीन

भारत में बच्चों को विभिन्न रोगों से बचाने के लिए टीकों के कार्यक्रम की संस्तुति निम्न रूप में की गयी है। (चित्र 14)

उम्र	टीका
0-1 माह तक	माता (चेचक) रोग, बी० सी० जी० (टी० बी० के लिए)
3 माह	डी० पी० टी०
	ओरल पोलियो (प्रथम खुराक), चेचक रोग के लिए यदि 0-1 माह में न लगा हो।
4 माह	ओरल पोलियो (द्वितीय खुराक)
5 माह	ओरल पोलियो (तृतीय खुराक)
	डी० पी० टी० (द्वितीय खुराक)
	बी० सी० जी० का टीका (यदि 0-1 माह में न लगा हो)
1 वर्ष	ओरल पोलियो (बूस्टर खुराक)
	चेचक रोग के लिए (द्वितीय टीका यदि 0-1 माह में न लगा हो)

2 वर्ष	डी० पी० टी० और पोलियो की बूस्टर खुराक
5-6 वर्ष	टायफाइड का टीका (एक खुराक)
	टेटनस टाक्साइड का बूस्टर डोज़
(स्कूल में प्रवेश पाने	बी० सी० जी० (द्वितीय टीका)
वाले बच्चों के लिए)	चेचक रोग के लिए (फिर टीका)

डाक्टर की राय के बाद ही चेचक रोग का टीका लगवाना चाहिए।

11-12 वर्ष	चेचक रोग का फिर टीका
बेसिक स्कूल छोड़ने	टेटनस टाक्साइड का बूस्टर
वाले बच्चों के लिए	टायफाइड वैक्सीन (मिश्रित)

रैबीज का टीका : पागल कुत्तों के काटने से हर वर्ष हमारे देश में हजारों लोग मरते हैं। इससे बचाव के लिए अब तक सबसे ज्यादा प्रयुक्त होने वाला टीका "पाश्चर वैक्सीन" है जिसमें पेट के ऊपर की त्वचा में 14 इंजेक्शन लगाये जाते हैं। इस टीके में खरगोश का मस्तिष्क और सुषुम्ना नाड़ी जिसमें रैबीज के विषाणु को मार दिया जाता है उपस्थित होते हैं। इसके 14 टीके लगने में बहुत कष्ट होता है तथा कभी- कभी टीके के कारण रोगी मनुष्य के शरीर में खरगोश के शरीर में मस्तिष्क एवं सुषुम्ना ऊतकों की वजह से एलर्जी उत्पन्न हो सकती है और इसके कारण पैरालिसिस के लक्षण उत्पन्न हो सकते हैं। परन्तु टीके के ऐसे लक्षण लाखों में केवल एकाध को ही हो सकता है। हाल ही में रैबीज के प्रति टीका बनाने की एक नई विधि का विकास हुआ है। इस नये टीके को "ह्यूमन डिप्लायड सैल वैक्सीन" कहते हैं। इसमें रैबीज विषाणु को "ह्यूमन डिप्लायड कोशिका" संवर्ध वृद्धि करते हैं। फिर इस उत्पाद में विषाणुओं को रासायनिक विधि से मार देते हैं। टीके के रूप में "ह्यूमन डिप्लायड सैल वैक्सीन" का उपयोग रैबीज के उपचार के लिए

बढ़ता जा रहा है क्योंकि इस टीके को पेट में लगाने के बजाय हाथ की मांसपेशी में और केवल पांच इंजेक्शन ही लगाते हैं। यह भी पाया गया है कि इस टीके से एलर्जी या पैरालिसिस के लक्षण उत्पन्न होने का प्रश्न ही नहीं उठता तथा इससे उत्पादित रैबीज रोग के प्रति अवरोध अच्छे स्तर का तथा बहुत लम्बे समय तक का होता है।

concepts and can be defended, I think, for the superior promise they hold in our triple task of predicting, understanding, and controlling behavior

Class concepts though they are, they do not necessarily exclude considerations of cultural influence nor the situational field It is especially those frames of reference adopted as the "wise prejudices" of our own station class, and culture that reflect prevailing social norms We are now making progress in the detailed study of conforming behavior, in the composition of ideological thought and in the genesis and development of frames in childhood[15] We are beginning to sort out that monstrously tangled heap our Councils have christened "personality and culture" Not yet, however, are we able to tell what makes a mauve decade mauve, or a skeptical age skeptical, or psychology in the 1880's soulful and in the 1930's soulless Nor do we know the extent to which a man can shake himself free of the influence of his times, or even recreate them to his liking Freud we know, had something to do with Queen Victoria's downfall, but was he consequence or cause? Who can say?

Speaking on this very campus forty years ago, John Dewey, later to become the eighth president of our Association, made what for that time was a striking observation (13) Psychology, he held cannot help but be politically conditioned He had in mind, for example, the fact that doctrines of the fixedness of human nature flourish in an aristocracy and perish in a democracy The privileges of the elite in ancient Greece, and the doctrines of the Church in mediaeval times, provided the setting for psychological theories of their day Under modern conditions theories of statehood play a major role[16]

The president of the *Deutsche Gesellschaft*, addressing that organization last year, praised typological studies that enabled psychology, in matters of heredity, race and education, to pick out the national *Gegentypus* whose unwelcome qualities are individualism and intellectualism In passing, he warned against using the mental tests that one of the great figures in psychology, William Stern, a

[15] Especially fascinating are the problems in this area Consider, for example, the question which frames the child adopts from his playmates and which from his parents Matters of politics and religion he ordinarily seems to refer to frames taken from parents, but standards of speech and clothing to frames acquired from his contemporaries Why does he do so?

[16] In this connection the striking fusion of John Dewey's own psychological theories with his allegiance to democracy is well worth special study (cf 3, Chap 9)

Jew, had introduced, and said that he wondered not at all that some of his colleagues had been censured for pursuing a pre-revolutionary course of thought. At the same time he added:

> Antagonists in foreign countries speak of coordination (*Gleichschaltung*) whenever conformity of science and politics is perceived. No, this conformity is certainly not based on coordination, but upon the fact that politics and science, now for the first time, strive after truth even in the basic questions of existence, over which heretofore darkness and error reigned (15, p. 14).

And what is the situation with us? Do we American psychologists lack politically determined attitudes? At first thought it would seem so, for are we not entirely free in our individual researches, and may we not hold any fantastic view that we choose? We may, and that proves the point for the political determinist, for only in a democracy can anything like a "socially detached intelligentsia" be realized. On the theory that democracy will ultimately gain by giving each thinker all the space he wants, we American psychologists are subsidized, encouraged, and defended. Each worker may elect, as he pleases, any section or subsection of psychology that he finds suited to his taste and abilities.

The desirability of keeping alive diversified investigation and a diversified sense of importance is the generous lesson that democracy teaches us. Now, if ever, must we learn it well and apply it to ourselves. If we rejoice, for example, that present-day psychology is—as Bills has pointed out (5) and as our survey has shown—increasingly *empirical, mechanistic, quantitative, nomothetic, analytic,* and *operational,* we should also beware of demanding slavish subservience to these presuppositions. Why not allow psychology as a science—for science is a broad and beneficent term—to be also *rational, teleological, qualitative, idiographic, synoptic,* and even *non-operational?* I mention these antitheses of virtue with deliberation, for the simple reason that great insights of psychology in the past—for example, those of Aristotle, Locke, Fechner, James, Freud—have stemmed from one or more of these unfashionable presuppositions.

My plea, therefore, is that we avoid authoritarianism, that we keep psychology from becoming a cult from which original and daring inquiry is ruled out by the application of one-sided tests of method, that we come to evaluate our science rather by its success in enhancing—above the levels achieved by common sense—our powers of *predicting, understanding,* and *controlling* human action. As an aid to progress I have tried especially to strengthen the case for research

upon complex patterns of human mental organization, frames of reference, the subject's point of view, and the act of understanding

If we but watch with amused humility our own personal frames affect our perceptions and our deeds, we will then enjoy and profit from our disagreements. Best of all, we shall be able to sink these disagreements into a common determination that the vast horizons of our science shall not prematurely close down, neither through bigotry, nor surrender to authoritarianism, nor through our failure to pay our way in the civilization that is sustaining us.

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36 ZANGWILL, O L Review of R S Woodworth's *Experimental psychology* *Brit J Psychol* 1939, **29**, 429-431

THE FUNCTIONAL AUTONOMY OF MOTIVES

Reprinted from *The American Journal of Psychology*, 1937, **50**, 141-156

For fifty years this JOURNAL has served both as a rich repository for research and as a remarkably sensitive record of the psychological temper of the times. These two services are of great historical value. Since there is no reason to doubt that *The American Journal* will continue to hold its position of leadership in the future, one wonders what new currents of psychological interest its pages will reflect in the coming half-century. With what problems will psychologists be chiefly concerned? What discoveries will they make? What types of scientific formulation will they prefer?

To predict at least one of these trends accurately requires no clairvoyance. On all sides we see the rising tide of interest in problems of personality. Up to a few years ago the somewhat segregated field of clinical psychology alone was concerned, but now theoretical and experimental psychology are likewise deeply affected. As never before the traditional portrait of the "generalized human mind" is being tested against the living models from which it is derived. As compared with particular minds it is found to lack locus, self-consciousness, organic character, and reciprocal interpenetration of parts, all of which are essential to personality. Unless I am greatly mistaken the coming half-century will see many attempts to replace the abstract datum (mind-in-general) with the concrete datum (mind-in-particular), even at the peril of a revolutionary upset in the conception of psychology as *science*.

Some of the best known definitions of psychology formulated in the past fifty years have given explicit recognition to the individuality of mind, that is, to its dependence upon the person. But these definitions have not as yet noticeably affected the abstractive tendency of psychological research—not even that of their authors. Wundt, James, and Titchener serve as examples. The first wrote: "*It* [psychology] *investigates the total content of experience in its relations to the subject.*" The second: "*Psychology is the science of finite individual minds,*" and the third:

"*Psychology is the study of experience considered as dependent on some person*" None of these authors developed his account of mental life to accord with his definition It is as though some vague sense of propriety guided them in framing their definitions, they *knew* that mind (as a psychological datum) exists only in finite and in personal forms Yet their historical positions—the spirit of the times in which they worked—prevented them from following their own definitions to the end. Had any one of them done so, the psychology of personality would have had early and illustrious sponsorship

In line with what I regard as a certain development in the psychology of the future I venture to submit a paper dealing, I think, with the one issue that above all others divides the study of mind-in-general from the study of mind-in-particular Motivation is the special theme, but the principle involved reaches into every nook and cranny of the evolving science of personality [1]

Two Kinds of Dynamic Psychology

Any type of psychology that treats *motives*, thereby endeavoring to answer the question as to *why* men behave as they do, is called a *dynamic psychology* By its very nature it cannot be merely a descriptive psychology, content to depict the *what* and the *how* of human behavior The boldness of dynamic psychology in striking for causes stands in marked contrast to the timid, "more scientific," view that seeks nothing else than the establishment of a mathematical function for the relation between some artificially simple stimulus and some equally artificial and simple response If the psychology of personality is to be more than a matter of coefficients of correlation it too must be a dynamic psychology, and seek first and foremost a sound and adequate theory of the nature of human dispositions

The type of dynamic psychology almost universally held, though sufficient from the point of view of the *abstract* motives of the generalized mind, fails to provide a foundation solid enough to bear the weight of any *single* full-bodied personality The reason is that prevailing dynamic doctrines refer every mature motive of personality to underlying original instincts, wishes, or needs, shared *by all men* Thus, the concert artist's devotion to his music is sometimes 'explained' as an extension of his self-assertive instinct, of the need for sentience, or as a symptom of some repressed striving of the libido In McDougall's

[1] What follows is drawn in part from Chapter VII of my forthcoming book, *Personality A Psychological Interpretation*, 1937

hormic psychology, for example, it is explicitly stated that only the instincts or propensities can be prime movers Though capable of extension (on both the receptive and executive sides), they are always few in number, common in all men, and established at birth The enthusiastic collector of bric-a-brac derives his enthusiasm from the parental instinct, so too does the kindly old philanthropist, as well as the mother of a brood It does not matter how different these three interests may seem to be, they derive their energy from the same source The principle is that a very few basic motives suffice for explaining the endless varieties of human interests The psychoanalyst holds the same over-simplified theory The number of human interests that he regards as so many canalizations of the one basic sexual instinct is past computation

The authors of this type of dynamic psychology are concerning themselves only with mind-in-general They seek a classification of the common and basic motives by which to explain both normal or neurotic behavior of *any* individual case (This is true even though they may regard their own list as heuristic or even as fictional) The plan really does not work The very fact that the lists are so different in their composition suggests--what to a naive observer is plain enough—that motives are almost infinitely varied among men, not only in form but in substance Not four wishes, nor eighteen propensities, nor any and all combinations of these, even with their extensions and variations, seem adequate to account for the endless variety of goals sought by an endless variety of mortals Paradoxically enough, in many personalities the few simplified needs or instincts alleged to be the *common* ground for all motivation, turn out to be completely lacking

The second type of dynamic psychology, the one here defended, regards adult motives as infinitely varied, and as self-sustaining, *contemporary* systems, growing out of antecedent systems, but functionally independent of them Just as a child gradually repudiates his dependence on his parents, develops a will of his own, becomes self-active and self-determining, and outlives his parents, so it is with motives Each motive has a definite point of origin which may possibly lie in instincts, or, more likely, in the organic tensions of infancy Chronologically speaking, all adult purposes can be traced back to these seed-forms in infancy, but as the individual matures the tie is broken Whatever bond remains, is historical, not functional

Such a theory is obviously opposed to psychoanalysis and to all other genetic accounts that assume inflexibility in the root purposes and

drives of life (Freud says that the structure of the Id *never* changes!) The theory declines to admit that the energies of adult personality are infantile or archaic in nature Motivation is *always* contemporary The life of modern Athens is *continuous* with the life of the ancient city, but it in no sense *depends* upon its present "go " The life of a tree is continuous with that of its seed, but the seed no longer sustains and nourishes the full grown tree. Earlier purposes lead into later purposes, and are abandoned in their favor

William James taught a curious doctrine that has been a matter for incredulous amusement ever since, the doctrine of the *transitoriness of instincts* According to this theory— not so quaint as sometimes thought — an instinct appears but once in a lifetime, whereupon it promptly disappears through its transformation into habits If there *are* instincts this is no doubt of their fate, for no instinct can retain its motivational force unimpaired after it has been absorbed and recast under the transforming influence of learning Such is the reasoning of James, and such is the logic of functional autonomy The psychology of personality must be a psychology of *post-instinctive* behavior

Woodworth has spoken of the transformation of "mechanisms" into "drives "[2] A mechanism Woodworth defines as any course of behavior that brings about an adjustment A *drive* is any neural process that releases mechanisms especially concerned with consummatory reactions In the course of learning, many preparatory mechanisms must be developed in order to lead to the consummation of an original purpose These mechanisms are the effective cause of activity in each succeeding mechanism, furnishing the drive for each stage following in the series Originally all these mechanisms were merely instrumental, only links in the long chain of processes involved in the achievement of an *instinctive* purpose, with time and development, with integration and elaboration, many of these mechanisms become activated directly, setting up a state of desire and tension for activities and objects no longer connected with the original impulse Activities and objects that earlier in the game were *means* to an end, now become *ends* in themselves [3]

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[2] R S Woodworth, *Dynamic Psychology*, 1918 Equivalent assertions are those of W Stern concerning the transformation of "phenomotives into genomotives" (*Allgemeine Psychologie*, 1935, 569), and of E C Tolman regarding the "strangle hold" that means-objects acquire by "setting up in their own right" (Psychology versus immediate experience, *Phil Sci* , 2, 1935, 370)

[3] The fundamental drive towards a certain end may be hunger, sex, pugnacity or what not, but once the activity is started, the means to the end becomes an object of interest on

Although Woodworth's choice of quasi-neurological terminology is not the best, his doctrine, or one like it is indispensable in accounting for the infinite number of effective motives possible in human life, and for their severance from the rudimentary desires of infancy Further discussion of the operation of the principle and a critique of Woodworth's position will be more to the point after a review of the evidence in favor of the principle

Evidence for Functional Autonomy

We begin in a common sense way An ex-sailor has a craving for the sea, a musician longs to return to his instrument after an enforced absence, a city-dweller yearns for his native hills, and a miser continues to amass his useless horde. Now, the sailor may have first acquired his love for the sea as an incident in his struggle to earn a living The sea was merely a conditioned stimulus associated with satisfaction of his 'nutritional craving But now the ex-sailor is perhaps a wealthy banker, the original motive is destroyed, and yet the hunger for the sea persists unabated, even increases in intensity as it becomes more remote from the nutritional segment' The musician may first have been stung by a rebuke or by a slur on his inferior performances into mastering his instrument, but now he is safely beyond the power of these taunts, there is no need to compensate further, now he loves his instrument more than anything else in the world Once indeed the city dweller may have associated the hills around his mountain home with nutritional and erotogenic satisfactions, but these satisfactions he now finds in his city home, *not* in the mountains, whence then comes all his hill-hunger? The miser perhaps learned his habits of thrift in dire necessity, or perhaps his thrift was a symptom of sexual perversion (as Freud would claim), and yet the miserliness persists, and even becomes stronger with the years, even after the necessity or the roots of the neurosis have been relieved

Workmanship is a good example of functional autonomy A good workman feels compelled to do clean-cut jobs even though his security, or the praise of others, no longer depends upon high standards In fact, in a day of jerry-building his workman-like standards may be to his economic disadvantage Even so he cannot do a slipshod job Workmanship is not an instinct, but so firm is the hold it may acquire on

its own account (Woodworth, *op cit*, 201) The primal forces of hunger, fear, sex, and the rest continue in force, but do not by any means, even with their combinations, account for the sum total of drives activating the experienced individual' (*ibid*, 104)

a man that it is little wonder Veblen mistook it for one A business man, long since secure economically, works himself into ill-health, and sometimes even back into poverty, for the sake of carrying on his plans What was once an instrumental technique becomes a master-motive

Neither necessity nor reason can make one contented permanently on a lonely island or on an isolated farm after one is adapted to active, energetic city life The acquired habits seem sufficient to urge one to a frenzied existence, even though reason and health demand the simpler life

The pursuit of literature, the development of good taste in clothes, the use of cosmetics, the acquiring of an automobile, strolls in the public park, or a winter in Miami—all may first serve, let us say, the interests of sex But every one of these instrumental activities may become an interest in itself, held for a life time, long after the erotic motive has been laid away in lavender People often find that they have lost allegiance to their original aims because of their deliberate preference for the many ways of achieving them

The maternal sentiment offers a final illustration Many young mothers bear their children unwillingly, dismayed at the thought of the drudgery of the future At first they may be indifferent to, or even hate, their offspring, the 'parental instinct' seems wholly lacking The only motives that hold such a mother to child-tending may be fear of what her critical neighbors will say, fear of the law, a habit of doing any job well, or perhaps a dim hope that the child will provide security for her in her old age However gross these motives, they are sufficient to hold her to her work, until through the practice of devotion her burden becomes a joy As her love for the child develops, her earlier practical motives are forgotten In later years not one of these original motives may operate The child may be incompetent, criminal, a disgrace to her, and far from serving as a staff for her declining years, he may continue to drain her resources and vitality The neighbors may criticize her for indulging the child, the law may exonerate her from allegiance, she certainly feels no pride in such a child, yet she sticks to him The tenacity of the maternal sentiment under such adversity is proverbial

Such examples from everyday experience could be multiplied ***ad infinitum*** The evidence, however, appears in sharper outline when it is taken from experimental and clinical studies In each of the following instances some new function emerges as an independently structured

unit from preceding functions The activity of these new units does not depend upon the continued activity of the units from which they developed

(1) *The circular reflex* Everyone has observed the almost endless repetition of acts by a child The good-natured parent who picks up a spoon repeatedly thrown down by a baby wearies of this occupation long before the infant does Such repetitive behavior, found likewise in early vocalization (babbling), and in other early forms of play, is commonly ascribed to the mechanism of the circular reflex [4] It is an elementary instance of functional autonomy, for any situation where the consummation of an act provides adequate stimulation for the repetition of the *same* act does not require any backward tracing of motives The act is self-perpetuating until it is inhibited by new activities or fatigue

(2) *Conative perseveration* Many experiments show that incompleted tasks set up tensions that tend to keep the individual at work until they are resolved No hypothesis of self-assertion, rivalry, or any other basic need, is required The completion of the task itself has become a quasi-need with dynamic force of its own It has been shown, for example, that interrupted tasks are better remembered than completed tasks,[5] that an individual interrupted in a task will, even in the face of considerable opposition return to that task,[6] that even trivial tasks undertaken in a casual way become almost haunting in character until they are completed [7]

Conative perseveration of this order is stronger if an empty interval of time follows the period of work, showing that *left to itself*, without the inhibiting effect of other duties or activities, the motive grows stronger and stronger The experiment of Kendig proves this point, as well as that of C E Smith [8] The latter investigator demonstrated that there is more success in removing a conditioned fear if the de conditioning process is commenced immediately After a twenty-four hour delay the fear has become set, and is more difficult to eradicate Hence the sound advice to drivers of automobiles or airplanes

[4] E B Holt, *Animal Drive and the Learning Process*, 1931, esp Chaps VII and VIII

[5] B Zeigarnik, Über das Behalten von erledigten und unerledigten Handlungen, *Psychol Forsch*, 9, 1927, 1-86

[6] M Ovsiankina, Die Wiederaufnahme unterbrochener Handlungen, *ibid*, 11, 1928, 302-379

[7] I Kendig, Studies in perseveration, *J Psychol*, 3, 1936, 223-264

[8] C E Smith, Change in the apparent resistance of the skin as a function of certain physiological and psychological factors, A thesis deposited in the Harvard College Library, 1934

who have been involved in an accident, that they drive again immediately to conquer the shock of the accident, lest the fear become set into a permanent phobia The rule seems to be that unless specifically inhibited all emotional shocks, given time to set, tend to take on a compulsive autonomous character

(3) *Conditioned reflexes not requiring reënforcement* The pure conditioned reflex readily dies out unless the secondary stimulus is occasionally reenforced by the primary stimulus The dog does not continue to salivate whenever it hears a bell unless sometimes at least an edible offering accompanies the bell But there are innumerable instances in human life where a single association, *never* reenforced, results in the establishment of a life-long dynamic system An experience associated only once with a bereavement, an accident, or a battle, may become the center of a permanent phobia or complex, not in the least dependent on a recurrence of the original shock

(4) *Counterparts in animal behavior* Though the validity of a principle in human psychology never depends upon its having a counterpart in animal psychology, still it is of interest to find functional autonomy in the lower organisms For example, rats, who will first learn a certain habit only under the incentive of some specific tension, as hunger, will, after learning, often perform the habit even when fed to repletion [9]

Another experiment shows that rats trained to follow a long and difficult path, will for a time persist in using this path, even though a short easy path to the goal is offered and even after the easier path has been learned [10] Among rats as among human beings, old and useless habits have considerable power in their own right

Olson studied the persistence of artificially induced scratching habits in rats Collodion applied to the ears of the animal set up removing and cleaning movements Four days later the application was repeated From that time on the animals showed significantly greater number of cleaning movements than control animals A month after the beginning of the experiment when the ears of the rats as studied by the microscope showed no further trace of irritation, the number of movements was still very great Whether the induced habit spasm was permanently retained the experimenter does not say [11]

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[9] J D Dodgson, Relative values of reward and punishment in habit formation, *Psychobiol*, 1, 1917, 231-276 This work has already been interpreted by K S Lashley as favoring Woodworth's dynamic theory as opposed to Freud's (Contributions of Freudism to psychology III Physiological analysis of the libido, *Psychol Rev*, 31, 1924, 192-202

[10] H C Gilhousen, Fixation of excess distance patterns in the white rat, *J Comp Psychol*, 16, 1933, 1-23

[11] W C Olson, *The Measurement of Nervous Habits in Normal Children*, 1929, 62-65

5. *Rhythm.* A rat whose activity bears a definite relation to his habits of feeding (being greatest just preceding a period of feeding and midway between two such periods) will, even when starved, display these rhythmic periodicities in activity. The acquired rhythm persists without dependence on the original periodic stimulation of feeding.[12]

Even a mollusc whose habits of burrowing in the sand and reappearing depend upon the movements of the tide, will, when removed from the beach to the laboratory, continue for several days in the same rhythm without the tide. Likewise certain animals, with nocturnal rhythms advantageous in avoiding enemies, obtaining food, or preventing excessive evaporation from the body, may exhibit such rhythms even when kept in a laboratory with constant conditions of illumination, humidity, and temperature.[13]

There are likewise instances where acquired rhythms in human life have taken on a dynamic character. Compulsive neurotics enter upon fugues or debauches, apparently not because of specific stimulation, but because "the time has come." A dipsomaniac, in confinement and deprived for months of his alcohol, describes the fierceness of the recurrent appetite (obviously acquired) as follows:

> These craving paroxysms occur at regular intervals, three weeks apart, lasting for several days. They are not weak, namby-pamby things for scoffers to laugh at. If not assuaged with liquor they become spells of physical and mental illness. My mouth drools saliva, my stomach and intestines seem cramped, and I become bilious, nauseated, and in a shaky nervous funk.[14]

In such states of drug addiction, as likewise in states of hunger, lust, fatigue, there is to be sure a physical craving, but the rhythms of the craving are partially acquired, and are always accentuated by the mental habits associated with it. For instance, eating in our civilized way of life takes place not because physical hunger naturally occurs three times a day, but because of habitual rhythms of expectancy. The habit of smoking is much more than a matter of craving for the specific narcotic effects of tobacco; it is a craving for the motor ritual and periodic distraction as well.

6. *Neuroses.* Why are acquired tics, stammering, sexual perversions, phobias, and anxiety so stubborn and so often incurable? Even psychoanalysis, with its deepest of depth-probing, seldom succeeds in

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[12] C. P. Richter, A behavioristic study of the activity of the rat, *Comp. Psychol. Monog.*, 1, 1922, no. 2, 1-55.

[13] S. C. Crawford, The habits and characteristics of nocturnal animals, *Quart. Rev. Biol.*, 9, 1934, 201-214.

[14] Inmate Ward Eight, *Beyond the Door of Delusion*, 1932, 281.

effecting *complete* cures in such cases, even though the patient may feel relieved or at least reconciled to his difficulties after treatment The reason seems to be that what are usually called 'symptoms' are in reality something more They have set themselves up in their own right as independent systems of motivation Merely disclosing their roots does not change their independent activity [15]

(7) *The relation between ability and interest* Psychometric studies have shown that the relation between ability and interest is always positive, often markedly so A person likes to do what he can do well Over and over again it has been demonstrated that the skill learned for some external reason, turns into an interest, and is self-propelling, even though the original reason for pursuing it has been lost A student who at first undertakes a field of study in college because it is prescribed, because it pleases his parents, or because it comes at a convenient hour, often ends by finding himself absorbed, perhaps for life, in the subject itself He is not happy without it The original motives are entirely lost What was a means to an end has become an end in itself

Furthermore, there is the case of genius A skill takes possession of the man No primitive motivation is needed to account for his persistent, absorbed activity It just *is* the alpha and omega of life to him. It is impossible to think of Pasteur's concern for health, food, sleep, or family, as the root of his devotion to his work For long periods of time he was oblivious of them all, losing himself in the white heat of research for which he had been trained and in which he had *acquired* a compelling and absorbing interest

A much more modest instance is the finding of industrial research that when special incentives are offered and work speeded up as a consequence, and then these special incentives removed, *the work continues at the speeded rate* The habit of working at a faster tempo persists without external support

(8) *Sentiments vs instincts* Every time an alleged instinct can by rigid analysis be demonstrated not to be innate but acquired, there is in this demonstration evidence for functional autonomy It is true enough that maternal conduct, gregariousness, curiosity, workman-

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[15] The case of W E Leonard, *The Locomotive God*, 1927, is instructive in this regard An intense phobia was not relieved by tracing its history backward to the start of life Even though he could explain why he was once frightened for a very good reason (by a locomotive), the author is quite unable to explain why now he is frightened *for no particular reason* Such neuroses, and psychotic delusional systems as well, often acquire a "strangle hold," and the task of dislodging them is usually more than therapeutic skill is equal to

ship, and the like, have the tenacity and compelling power that instincts are supposed to have If they are not instincts, then they must be autonomous sentiments with as much dynamic character as has been attributed to instincts It is not necessary here to review all the arguments in favor of regarding such alleged instincts as acquired sentiments

(g) *The dynamic character of personal values* When an interest-system has once been formed it not only creates a tensional condition that may be readily aroused, leading to overt conduct in some way satisfying to the interest, but it also acts as a silent agent for selecting and directing any behavior related to it Take the case of people with strongly marked esthetic interests Experiments with the word-association test have shown that such people respond more quickly to stimulus-words connected with this interest than to words relating to interests they lack [16] Likewise, in scanning a newspaper they will observe and remember more items pertaining to art, they also take a greater interest in clothes than do non-esthetic people, and when they are asked to rate the virtues of others, they place esthetic qualities high In short the existence of a well established acquired interest exerts a directive and determining effect on conduct just as is to be expected of any dynamic system The evidence can be duplicated for many interests other than the esthetic [17]

CRITIQUE OF FUNCTIONAL AUTONOMY

Objections to the principle of autonomy may be expected from two sides Behaviorists will continue to prefer their conception of organic drive with its capacity for manifold conditioning by ever receding stimuli Whereas purposivists will be unwilling to accept a pluralistic principle that seems to leave motives so largely at the mercy of learning

The behaviorist is well satisfied with motivation in terms of organic drive and conditioning because he feels that he somehow has secure anchorage in physiological structure (The closer he approaches physiological structure the happier the behaviorist is) But the truth of the matter is that the neural physiology of organic drive and conditioning is no better established, and no easier to imagine, than is the neural physiology of the type of complex autonomous units of motivation here described

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[16] H Cantril, General and specific attitudes, *Psychol Monog* , 42, 1932, (no 192), 1–109

[17] H Cantril and G W Allport, Recent applications of the *study of values*, *J Abnorm & Soc Psychol* , 28, 1933, 259–273

Two behavioristic principles will be said to account adequately for the instances of functional autonomy previously cited, viz., the circular reflex and cross-conditioning. The former concept, acceptable enough when applied to infant behavior, merely says that the more activity a muscle engages in, the more activity of the same sort does it engender through a self-sustaining circuit.[18] This is, to be sure, a clear instance of autonomy, albeit on a primitive level, oversimplified so far as adult conduct is concerned. The doctrine of cross-conditioning refers to subtle recession of stimuli, and to the intricate possibility of cross-connections in conditioning. For instance, such ubiquitous external stimuli as humidity, daylight, gravitation, may feed collaterally into open channels of activity, arousing mysteriously and unexpectedly a form of conduct to which they have unconsciously been conditioned. For example, the angler whose fishing expeditions have been accompanied by sun, wind, or a balmy June day, may feel a desire to go fishing whenever the barometer, the thermometer, or the calendar in his city home tells him that these conditions prevail.[19] Innumerable such crossed stimuli are said to account for the arousal of earlier patterns of activity.

Such a theory inherits, first of all, the well-known difficulties resident in the principle of conditioning whenever it is made the sole explanation of human behavior. Further, though the reflex circle and cross-conditioning may in fact exist, they are really rather trivial principles. They leave the formation of interest and its occasional arousal almost entirely to chance factors of stimulation. They give no picture at all of the spontaneous and variable aspects of traits, interests, or sentiments. These dispositions are regarded as purely *reactive* in nature, the stimulus is all-important. The truth is that dispositions *sort out* stimuli congenial to them, and this activity does not in the least resemble the rigidity of reflex response.[20]

A variant on the doctrine of cross-conditioning is the principle of redintegration.[21] This concept admits the existence of highly integrated dispositions of a neuropsychic order. These dispositions can be aroused *as a whole* by any stimulus previously associated with their

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[18] E. B. Holt, *op. cit.*, 38.

[19] *Ibid.*, 224.

[20] The basic fact that complex "higher" centers have the power of inhibiting, selecting, and initiating the activity of simpler segmental responses is a fact too well established to need elaboration here. It constitutes the very foundation of the psychophysiological theories advanced by Sherrington, Herrick, Dodge, Köhler, Troland, and many others.

[21] Cf. H. L. Hollingworth, *Psychology of the Functional Neuroses*, 1920.

functioning In this theory likewise, the disposition is regarded as a rather passive affair, waiting for reactivation by some portion of the original stimulus Here again the variability of the disposition and its urge-like quality are not accounted for The stimulus is thought merely to reinstate a complex determining tendency Nothing is said about how the stimuli themselves are *selected*, why a motive once aroused becomes insistent, surmounting obstacles, skillfully subordinating conflicting impulses, and inhibiting irrelevant trains of thought

In certain respects the principle of autonomy stands midway between the behavioristic view and the thoroughgoing purposive psychology of the hormic order It agrees with the former in emphasizing the acquisition of motives, in avoiding an a priori and unchanging set of original urges, and in recognizing as limited principles) the operation of the circular response and cross-conditioning It agrees with the hormic psychologist, however, in finding that striving-from-within is a far more essential characteristic of motive than stimulation-from-without It agrees likewise in distrusting the emphasis upon stomach contractions and other "excess and deficit stimuli" as "causes" of mature behavior Such segmental sources of energy even when conditioned cannot possibly account for the "go" of conduct But functional autonomy does not rely as does hormic theory upon modified instinct, which after all is as archaic a principle as the conditioning of autonomic segmental tensions, but upon the capacity of human beings to replenish their energy through a plurality of constantly changing systems of a dynamic order

The hormic psychologist, however, will not accept the autonomy of new motivational systems If mechanisms can turn into drives, he asks, why is it that habits and skills as they become exercised to the point of perfection do not acquire an ever increasing driving force?[22] The mechanisms of walking, speaking, or dressing, cannot be said to furnish their own motive-power One walks, speaks, or dresses in order to satisfy a motive entirely external to these learned skills [23]

The criticism is sufficiently cogent to call into question Woodworth's form of stating the principle, viz, "mechanisms may become drives" It is not an adequate statement of the case

Looking at the issue more closely it seems to be neither the perfected

[22] W McDougall, Motives in the light of recent discussion, *Mind*, 29, 1920, 277–293

[23] Though this objection is usually valid, it is not always so, for there are cases where the liking for walks, for talking for the sake of talking, or for dressing, playing games, etc, seems to be a self-sustaining motivational system

talent nor the automatic habit that has driving power, but the imperfect talent and the habit-in-the-making The child who is *just learning* to speak, to walk, or to dress is, in fact, likely to engage in these activities for their own sake, precisely as does the adult who has an *unfinished* task in hand He remembers it, returns to it, and suffers a feeling of frustration if he is prevented from engaging in it Motives are always a kind of striving for some form of completion, they are unresolved tension, and demand a "closure" to activity under way (Latent motives are dispositions that are easily thrown by a stimulus or by a train of associations into this state of active tension) The active motive subsides when its goal is reached, or in the case of a motor skill, when it has become at last automatic The novice in automobile driving has an unquestionable impulse to master the skill Once acquired the ability sinks to the level of an *instrumental* disposition and is aroused only in the service of some other *driving* (unfulfilled) motive

Now, in the case of the permanent interests of personality, the situation is the same A man whose motive is to acquire learning, or to perfect his craft, can never be satisfied that he has reached the end of his quest, for his problems are never completely solved, his skill is never perfect Lasting interests are recurrent sources of discontent, and from their incompleteness they derive their forward impetus Art, science, religion, love, are never perfected Motor skills, however, are often perfected, and beyond that stage they seldom provide their own motive power It is, then, only mechanisms-on-the-make (in process of perfecting) that serve as drives With this emendation, Woodworth's view is corrected, and McDougall's objection is met [24]

IMPLICATIONS OF FUNCTIONAL AUTONOMY

The principle of functional autonomy accounts, as no other principle of dynamic psychology is able to do, for the concrete impulses that lie at the root of personal behavior It is thus the first step in establishing a basis for the more realistic study of unique and individual forms for personality "But how—" the traditionalists may cry, "how are we ever to have a *science* of unique events? Science must generalize " So it must, but it is a manifest error to assume that a general principle of motivation must involve the postulation of abstract or general motives What the objectors forget is that *a general law may be a law that tells*

[24] This theory embraces very easily the work of K Lewin and his associates upon the nature of "quasi needs " The urgency of these needs is greatest just before a goal is reached, after which time the motive subsides completely

how uniqueness comes about The principle of functional autonomy is general enough to meet the needs of science, but particularized enough in its operation to account for the uniqueness of personal conduct Its specific advantages stand out in the following summary

(*1*) It clears the way for a completely dynamic psychology of *traits*, *attitudes*, *interests*, and *sentiments*, which can now be regarded as the ultimate and true dispositions of the mature personality

(*2*) It avoids the absurdity of regarding the energy of life now, in the *present*, as somehow consisting of early archaic forms (instincts, prepotent reflexes, or the never-changing Id) Learning brings new systems of interests into existence just as it does new abilities and skills At each stage of development these interests are always contemporary, whatever drives, drives *now*

(*3*) It dethrones the stimulus A motive is no longer regarded as a mechanical reflex or as a matter of redintegration, depending entirely upon the capricious operation of a conditioned stimulus In a very real sense dispositions *select* the stimuli to which they respond, even though *some* stimulus is required for their arousal

(*4*) It readily admits the validity of all other established principles of growth Functional autonomy recognizes the products of differentiation, integration, maturation, exercise, imitation, suggestion, conditioning, trauma, and all other processes of development, and allows, as they do not, considered by themselves, for the preservation of these products in significant motivational patterns

(*5*) It places in proper perspective the problems of the origin of conduct by removing the fetish of the genetic method Not that the historical view of behavior is unimportant for a complete understanding of personality, but so far as *motives* are concerned the cross-sectional dynamic analysis is more significant Motives being always contemporary should be studied in their present structure Failure to do so is probably the chief reason why psychoanalysis meets so many defeats, as do all other therapeutic schemes relying too exclusively upon uncovering the motives of early childhood

(*6*) It accounts for the force of delusions, shell-shock, phobias, and all manner of compulsive and maladaptive behavior One would expect such unrealistic modes of adjustment to be given up as they are shown to be poor ways of confronting the environment Insight and the law of effect should both remove them—but too often they have acquired a strangle hold in their own right

(7) At last we can account adequately for socialized and civilized behavior The principle supplies the correction necessary to the faulty logic of *bellum omnium contra omnes* Starting life, as a completely selfish being, the child would indeed remain entirely wolfish and piggish throughout his days unless genuine transformations of motives took place Motives being completely alterable, the dogma of Egoism turns out to be a callow and superficial philosophy of behavior, or else a useless redundancy

(8) It explains likewise why a person often *becomes* what at first he merely *pretends* to be—the smiling professional hostess who grows fond of her once irksome rôle and is unhappy when deprived of it, the man who for so long has counterfeited the appearance of self-confidence and optimism that he is always driven to assume it, the prisoner who comes to love his shackles Such *personae*, as Jung observes, are often transformed into the real self The mask becomes the *anima*

(9) The drive behind genius is explained Gifted people demand the exercise of their talents, even when no other reward lies ahead In lesser degree the various hobbies, the artistic, or the intellectual interests of any person show the same significant autonomy

(10) In brief, the principle of functional autonomy is a declaration of independence for the psychology of personality Though in itself a general law, at the same time it helps to account, not for the abstract motivation of an impersonal and therefore non-existent mind-in-general, but for the concrete, viable motives of each and every mind-in-particular.

MOTIVATION IN PERSONALITY: REPLY TO MR. BERTOCCI

Reprinted from *Psychological Review*, 47, No. 6, November 1940, 533-554

I. Introduction

Mr. Bertocci has written an accurate and challenging critique of my views regarding the nature of motivation in human personality (4). Because he has read my work sympathetically and checked his understanding of my position with care his criticisms are helpful and relevant. Where on rare occasion misunderstanding still remains, it is I and not my critic who must take the blame.

It will be noted that Mr. Bertocci shapes his attack essentially from the McDougallian point of view. When McDougall died shortly after the publication of my book I gave up hope of ever benefiting from his fierce but friendly criticisms. Mr. Bertocci has now rescued me from disappointment and has laid upon me with the same hefty cudgels that McDougall would have used, and for good measure has employed a few additional cudgels of his own.

His attack, as I see it, must be met on seven fronts, *viz.*, (1) the argument for hormic purposivism, (2) the sufficiency of instinct, (3) the necessity in science for employing universal dimensions, (4) the 'mystery' of ontogenetic emergence, (5) the nature of functional autonomy, (6) adequate accounting for continuity in personality, and (7) the place of sentiments in the structure of personality. Each of these lines of attack calls for extensive defense and counter-offense, but since space is limited and since some of the disputed issues are by their very nature insoluble, I shall try to content myself with the briefest possible rebuttal.

II. Purpose *versus* Mechanism

Mr. Bertocci accuses me of wobbling between the principle of purpose and the principle of mechanism. Specifically he

does not like the emergent step implied in my contrast between the apparently mechanistic 'push' in infancy and the apparently teleological 'pull' in maturity In later pages I shall attempt to meet his objections to emergence, but for the moment confine myself to one or two general comments on the nature of purpose and of mechanism.

In modern times it seems to me that the former sharp antagonism between these two principles of explanation has been somewhat overcome. Mechanistic reflexology has certainly been vanquished, and in recent times its adherents seem to have been re-aligning themselves either with the operational creed which is frankly sceptical of the principle of causation, or else with the organismic position that redefines both purpose and mechanism, reconciling them within the new concepts of *structure* and *system* From this latter point of view—to which I subscribe it seems unnecessary to ask whether reflex irritability defines and limits goal-seeking responses, or whether goal-seeking is an initial property to which reflex irritability merely holds various 'keys.' The modern tendency is to deal with systemic properties in nature, conceived as neither mechanistic nor purposive but as *organismic.* Just as modern physics has redefined the meaning of 'contact' in such a way that 'push' and 'pull' give place to the concept of interacting molecular systems, so too psychology largely under the influence of Gestalt theory is dealing these days with patterned events, contexts that constrain, structural wholes [1]

When I remarked to Mr. Bertocci in personal correspondence which he quotes that I saw no difficulty in embracing a principle of 'push' in infancy and of 'pull' in maturity, I did not intend to commit myself to so extreme a paradox as he has made of it Whether the system that we call gravitation 'pushes' or 'pulls' at my feet it is, as Eddington has shown, impossible to say. Similarly the pattern of hunger behavior in an infant is marked by a sequence of events that may be viewed as either mechanistic or purposive, but preferably as

[1] For evidence of the rise of this tendency in contemporary psychology see J S Bruner and G W Allport (6)

systemic and self-regulating. Yet—and this is the important point—as compared with the corresponding events in adulthood this infantile hunger-system lacks foresight, respect for taboo, epicurean embellishments, idiosyncrasy of taste and all other ideational features. I think, therefore, that we may truly say that the infant is, *relative to the adult*, 'pushed' by immediate, simple, vegetative and proximate features in his hunger system. The adult is to a greater degree 'pulled' by the delayed, ideational, non-proximate features in his system of hunger-behavior. Push and pull are therefore relative terms, signifying respectively the presence of less or more of the personalized and planful components in a system of events and the presence of a slight and limited environmental stimulus field, or the presence of a richly extended and diversified stimulus field.

Were I *forced* to choose between mechanism and purposivism as an ultimate principle of motivation, I should unhesitatingly choose—as I think my book amply indicates—purposivism. Yet I think it entirely proper to see in infancy *less* evidence of purposive behavior than in adulthood. Infant behavior, I submit, conforms more closely to the alleged characteristics of drive-impelled conduct. Adult behavior with its widened consciousness of goals, and with its lavish use of symbols and all higher mental operations, on the other hand, shows the working of a type of motivation that can only be expressed in terms of *interest*, *attitude*, *value*, *desire*, *will*—terms quite inappropriate to infancy.

Bertocci, I believe, agrees with me concerning the barrenness for psychology of the postulate of an initial *Hormé*. Neither of us is disposed to deny it metaphysical status, but we both want it broken up into particular manifestations—he into McDougallian propensities; I into individualized motivational systems. His complaint is that in accepting an *élan* and in denying instincts I am guilty of metaphysical abstraction with a vengeance. My reply is that to me individualized motivational systems seem just as saturated with *élan*, ego-involvement, urge, or *Hormé* as do the alleged instincts; but as expressions of *élan*, they are variable, personal,

and empirically discovered rather than universal, external, and *a priori*

III THE SUFFICIENCY OF INSTINCTS

And so we come to the instinct controversy. Let it be remembered that only instincts in McDougall's sense are here the issue, for Bertocci does not rest his case on such innate sensory-motor co-ordinations as have been empirically established. The principal difficulty with McDougall's set channels of purpose is precisely this They never can be discovered empirically. Two assumptions make them fatally elusive. (*a*) the contention that "propensities are but loosely geared to goals,"—this contention making it possible always to interpret any case as fitting the formula, and (*b*) the reliance on maturation of purposes, another proposition unverifiable It is recognized that some course of learning invariably precedes alleged maturation. It would be impossible, I think, ever to demonstrate that sympathy matures as a 'non-specific innate tendency,' because two or three years of individualizing personal experience precede its overt manifestations. Since purposes never ripen in an experiential vacuum I think it is wiser to order the phenomenon of the growth of motives to the psychology of progressive mental organization—in other words, to the psychology of learning My critic, on the other hand, prefers to believe that learning can best be subordinated to the doctrine of fixed motives which throughout life predetermine 'in a general way' the direction of active response Later I shall give other reasons for thinking that learning rather than inheritance is the leading category in the psychology of motivation.

To another of my objections—that the assumption of universal instincts is not a parsimonious procedure—Mr. Bertocci rightly, but not altogether relevantly, retorts that it is the scientist and not nature that shows a partiality for parsimony. (Certainly in my ascribing 'an infinite variety of motives to an infinite variety of mortals' I myself am in no danger of saddling nature with the canon of parsimony.) But the point is that instincts explain *too much*. Even Mc-

Dougall admits that people can be found who seem to lack one or more of the 18 primary propensities. If this is so, then to regard the 18 (or any other number) as 'normal' and the exceptions as 'abnormal' is clearly an extravagant convention. In nature, we must assume, there are no exceptions, every case is completely and adequately determined by law. If then, certain purposes seem to be absent in some people, why should we suppose they were ever meant to be there? Only if purposes can empirically be shown to be present are we obliged to account for them In the psychology of personality we need a law of motivation that will have no exceptions. Even a formula of considerable subsumptive power is not enough, for unlike other branches of science, the psychology of personality is bound to account for *individuality*. Instincts being universal in their reference lack individualizing power

Before expanding this last remark I should like to call attention to one promising feature of Mr. Bertocci's position He admits that in the course of development a person's abilities and individual temperament, as well as the exigencies of his peculiar environment, have an individualizing effect on his purposes so that his goals are not exact duplicates of other people's goals. He admits likewise that "all actual, existential goal-seeking, as opposed to the conceptual description of it, is specific and individual. One never seeks food in general or recognition in general, but his actual seeking is always undergoing particular psycho-physiological processes in relation to particular food, people, and so on." These admissions seem to show that Mr Bertocci is impressed by precisely what impresses me—by the concrete and individual character of 'actual, existential goal-seeking' Am I wrong in believing that in the passage just quoted he admits a contradiction between the impressively concrete, unique, and personal character of goal-seeking, and the 'conceptual description' of it that he is defending?

IV. Necessity for Universal Dimensions

While admitting—in the passage just quoted and in others—that uniqueness is the mark of personality, that "life exists in individual forms," Bertocci, like other of my critics, insists that "to accept uniqueness as alone ultimate is to destroy the possibility of rational knowledge of any sort Uniqueness can be felt, lived through, but not expressed or understood in relation to other common factors." He writes also: "My understanding can assimilate unique individuality only by noting the extent to which it is similar to and different from other individuals known to me." In these passages Bertocci is stating the traditional view of psychological science that the data of human nature must be treated nomothetically (in terms of general dimensions) and that scientific understanding of these data proceeds through inference (associative comparison).

Readers of my book (2) will perhaps recall that I endorse the use of nomothetic procedures (*e g*, Ch. 15 on 'Common Traits') and admit the importance of inference in the process of understanding people (Ch. 19, 'Inference and Intuition'). Certainly I would subscribe to Mr. Bertocci's statement that "psychology would do well to search for whatever universality may be found in human motivation" But unlike Bertocci and my other critics I am unwilling to stop here. I believe there is—*in addition* to these nomothetic and inferential procedures common to all science—something quite special about the psychology of personality that marks it off from all other branches of science, namely, its obligation to deal with integrated individuality. In order to fulfill this special obligation I submit that the psychology of personality needs *not only* the customary procedures and habits of thought employed by nomothetic and inferential science, but needs to develop likewise new idiographic methods and intuitive skills.[2] "A complete study of the individual," I have written, "will embrace both approaches."

Freud, Adler, Spearman, McDougall, Murray, Kretsch-

[2] A particularly effective argument for this point has been made by D L Watson

mer, Thurstone, Guilford, and others have produced nomothetic dimensions to which personalities are to be ordered. But consider the differences, and even the contradictions, between these dimensional schemes! Think too of the lists of 'primary motives' in textbooks of psychology. I doubt that there is justification for Bertocci's statement that we know some of the 'inevitable components of human motivation.' Even where agreement seems to be reached—Bertocci suggests hunger, sex, fear, anger—the biological capacities mentioned have nothing much to do with the personal level of conduct, and they illuminate little if at all the concrete needs and specifiable desires of actual individuals.

The question is this. Can we not, even while we make use of many maps prepared by many nomothetists, get still closer to the structure of personality by fixing our attention upon individual lives? So to fix our attention requires, of course, a certain re-centering of our theories, (I suggest, for example, the theory of traits and the principle of functional autonomy). Required also are new and different methods of study (greater use, among other techniques, of *intra-individual* statistics, case studies, matching, interviews, expressive and stylistic procedures, and the like). McDougall's map of the propensities is suggestive—so too are all other maps. They serve to call attention to *probable* emotional foci in certain lives. I say 'probable,' not because Providence has endowed all men with eighteen channels of purpose, but because "similarly constructed individuals living in similar environments influenced by similar culture, *would* develop similar goals and employ similar modes of obtaining them."

This last quotation (from page 113 of my book) offends my critic deeply. He accuses me of placing too much weight on culture, of overlooking instincts which alone can be 'the basic cause of culture and its similarity in the first place.' My reply is that the universal features in cultural practices all over the earth appear to be too few in number to argue from them to common instinctive causation. Of course, universal features in the bodily structure of *Homo Sapiens* lie at the root of certain bodily needs, but there is not one of these

needs which is not strangely revised and transformed at the psychological level before it becomes an actual, integrated motivational system (I have just been reading a well-attested account of orthodox Jews who in Nazi concentration camps suffered inanition and not infrequently death by refusing to violate the food restrictions of their religion.) It is for this reason that I think of biological needs or tissue change as offering a wholly inadequate, sub-personal, picture of psychological motivation.

As I pointed out in the preceding section this personalizing of motives, different in each life, seems to be admitted by my critic. He writes "The statement, 'men hunger for food,' is a highly abstract description of the concrete unique hunger-pangs and the concrete, unique food seeking which are actually involved." Such admissions, it seems to me, prepare the way for a more concrete theory of motivation which will account for the fact that systems of desires are well integrated, and that the object of desire is by no means arbitrary and detachable—as the cathexis theory holds—but is rather a firm part of the system itself.

To summarize: As a first approximation I have no objection to the use of a conceptual schedule of two drives, four wishes, eighteen propensities, or twenty-five needs in approaching the motives of men. Such maps are useful in calling attention to the sort of things that people (physically similar in structure) exposed to roughly similar environments and cultures commonly desire. But this type of nomothetic procedure runs its course on a plane of abstraction that is not within reach of actual personalities. A full-bodied psychology of personality (as opposed to a general psychology of motives) must do a better job. A law of motivation that accounts for the individual organizations of desires is in order. Although I am aware of the argument made by Bertocci and others that "we cannot give up the search for the common pattern underlying various purposes simply because our predecessors and contemporaries disagree about the number and kinds of irreducible unlearned motives," yet I am a bit pessimistic. Within 2000 years of self-conscious psychologizing

no stencil to fit human desires has yet been found, because, I suspect, there is none to find May it not be that the 'irreducible unlearned motives' of men are—excepting in early infancy a scientific will of the wisp?

To the instinctivist it seems that 'the extension, variation, condensation of propensities' can account for all variety that is needed. To this view I reply that Procrustes had a similar ambition for his bed. Of course cases can be sheared to fit. But unless academic psychologists concern themselves with the problem of the integral individuality of the motivational pattern (as some clinical psychologists do) I fear they will forever be wrangling about the relative merits of their respective Procrustean couches. All stencils fit concrete cases only with the loosest approximation. They seldom help the clinician or the average man in understanding the structure of the individual life.

V. The Principle of Ontogenetic Emergence

Mr. Bertocci asks, "Can a need of given limitations be the father of a need which is totally different?" He thinks it cannot; I think it can. He believes that it would abrogate continuity in personality to have 'outright novelties' emerge; he holds that learning is not a process of adding in number to the purposive tendencies resident in the original nature of man, and he regards it as all very mysterious how any new purposes can ever evolve. He concludes: "As the situation now stands, we can appeal to the mysterious concept of ontogenetic emergent evolution to account for the appearance of new needs and consequent pleasures Or we can appeal to an instinct-theory which attempts to delineate what these basic drives (and consequent pleasures) are in the first place, and then show how they are modified by ability and environment to constitute the uniqueness and the continuity of the individual personality." To me it seems that personal interests undergo marked and essential change in the course of life: that when we become men we put away for the most part the desires of childhood It is not merely the 'object cathexis' that is altered, it is the basic structure of motivation

Mr Bertocci himself thinks of human personality as 'always in a state of transition,' but he regards the transition as applying to skills and abilities rather than to the 'general ends implicit in its very being.' Just why *transition* should characterize the *Rustungsdispositionen* and not the *Richtungsdispositionen* is not evident to me So far as the directional dispositions are concerned I incline toward Wundt's view expressed in his almost forgotten principle of the 'heterogeny of ends' Primitive man—to cite his somewhat florid example—entered a cave to take refuge from a storm, and finding there a wild dog likewise taking shelter, he emerged from the cave with a desire and plan for domesticating the dog. New purposes have their seeds in old purposes, but the satisfactions they yield are so unexpected, so unpredictable, that only some such principle as the 'heterogeny of ends,' or 'functional autonomy' seems to cover the obvious facts.

My critic argues—and I am glad to agree with him—that the logic of learning must apply to both skills and motives equally The dispute then comes to a head in the question whether learning creates *novel* skills and purposes or mere variations on the *old*. Since Mr. Bertocci does not favor the emergence of new purposes (although he has written, "novelties in human motivation are the empirical facts that break the back of any mechanical theory of instinct"), he is forced to deny the creation of novel abilities (although he has admitted that human personality is 'always in a state of transition'). "No psychologist," he says, "talks about the outright creation of a new ability within the lifetime of a given individual A 'new' ability would be a particular, environmentally provoked, development of a given ability. What fact alters the use of this same logic when we come to motivation?" I agree that the same logic must prevail, but I doubt that every psychologist would look upon new skills as mere variations on the old. Is the dextrous piano playing of Horowitz 'a particular, environmentally provoked, development' of his infantile grasp reflex (or some other 'given' ability)? Is the oratory of a Demosthenes essentially a modification of his infant babble? And what functional continuity

with some 'given' ability can be demonstrated in the case of skills employed in surgery, aviation, or writing verse? If skills can change until they are wholly unrecognizable and no longer dependent functionally on their seed-forms, so too can motives. I am glad Mr. Bertocci admits that the same logic must apply to both. (In making this admission I think he is on sounder ground than some critics who seem to hold that while learning may transform skills it somehow passes motivation by, leaving it preserved in the waterglass of infancy. Just why learning should reintegrate patterns of skill and not of motives no one has yet explained.)

The emergent step regarded by my critic as most outrageous is my apparent shift (in discussing the ontogenetic course of development) from a mechanistic to a purposive view of motives. "Why begin with the psychological (purposive) level of description at the age of two or three?" he asks, and adds, "the hormist starts with the psychic level of purposive striving and maintains it throughout." I think I have met this objection in my denial that I would regard 'push' and 'pull' as essentially opposed principles. They are merely convenient terms for expressing the fact that the infant seems to be a more vegetative creature than the adult. Bertocci regards it as inconceivable that sophisticated purposes should emerge from vegetative urges. It is black magic, he thinks, to hold that out of the young infant's demand for only the physical comfort its mother can give, should eventually grow a craving for the 'social, æsthetic, and mental' comfort of her companionship. This proposition does not seem magical to me, but on the contrary about as simple and straightforward a statement of empirical fact as we are likely to find in the realm of motivation.

We do need, I admit, a psychology of learning that will explain how transformations come about from the pre-social or vegetative drives to social, æsthetic, and spiritual desires. This particular problem has not, I believe, been adequately considered. Although I cannot discuss it here, I would call attention to two helpful principles in learning, both of them strangely neglected not only by motivationists but by psy-

chologists in general. (1) Sheer familiarity seems to engender positive valuing (demand) on the part of an organism. Ask a child if he thinks American children are nicer than the children of any other nationality. He will reply yes. If you ask why, the child with naive insight will probably say, "Because I *know* American children and don't know the others." Even an infant, through sheer habituation, without human companionship, develops free locomotion and play in a strange room after 8–10 trials: another sign of the affective value of familiar situations. Let psychologists explore the dynamic effects of an accustomed situation, if they would discover one reason why motivation becomes transformed, why habits become 'drives.' (2) The psychology of learning has not, I think, given adequate recognition to the dynamic character of the task-attitude. Let a task be accepted for any reason at all, and the attitude engendered seems to furnish its own drive until accomplishment is reached. If it is objected that this perseverative principle depends upon ego-involvement, I shall agree, but the important point is that while the ego is set upon completing an enterprise it has temporarily adopted, this enterprise itself helps to reconstitute the demands and desires of the ego. For example, a young man in college studies his psychology hard in order to reward his immature ego with a pat on the back from his professor. The subject gradually gets under his skin, and high grades come to mean less to him than the solution of intellectual puzzles. Finally, through years of study he equips himself to become a researcher, a teacher, or, perhaps a clinician. All along the line the ego is served, but in the process it is also redefined and reconstructed. The study of psychology serves the *élan*, but the tasks imposed in the course of study create ever new demands and satisfactions on the part of this *élan*. To generalize the illustration, the progressive acceptance of adaptive tasks throughout one's lifetime results inevitably in continuous change in the motivational demands at successive stages in the individual's development. The following section amplifies this proposition which, I submit, represents a second neglected principle of motive-learning.

VI. The Nature of Functional Autonomy

The principle of functional autonomy holds (1) that all motives are contemporary, that whatever drives must drive now, that the 'go' of a motive is not bound functionally to its historical origins or to early goals, but to present goals only, (2) that the character of motives alters so radically from infancy to maturity that we may speak of adult motives as *supplanting* the motives of infancy, (3) that the maturity of personality is measured by the degree of functional autonomy its motives have achieved; even though in every personality there are archaisms (infantilisms, regressions, reflex responses), still the cultivated and socialized individual shows maturity to the extent he has overcome early forms of motivation, (4) that the differentiating course of learning (reflecting ever more diversified environmental influence), acting upon divergent temperaments and abilities, creates individualized motives The dynamic structure of every personality is unique, although similarities due to species, culture, stages of development, climate, may produce certain resemblances that justify—so long as they are admitted to be approximations—the use of universal dimensions for the purposes of comparing individuals in reference to a norm, or for the purpose of constructing convenient 'types' according to the special interests of the investigator While not denying the possible existence of instincts in infancy—or even the persistence of some instinctive (or reflex) forms of activity throughout life—still the principle of functional autonomy regards the *developed* personality as essentially a post-instinctive phenomenon

Bertocci believes that the instinct doctrine is sufficiently flexible to account for the known modifiability of motives. He thinks that my arguments would be valid if "according to instinct-theory the present motive had somehow to reach back into the non-existent past for its 'go,'" or if "we supposed that propensities were constant streams of energy, piped in fixed ways through the individual." But he concludes that I labor under too substantive a conception of propensitive action, and that McDougallian propensities are so 'generic' and so 'loosely geared,' that they escape my criticisms.

I can only reply that McDougall's account of propensities seems to me highly substantive. To quote one illustrative passage,

Thus a man's efforts to attain success in the practice of his profession may be sustained by tendencies springing from *several propensities, at one moment one of these, at another some tendency of a very different source, playing the predominant part* . . . And he is fortunate and happy in so far as these *several powerful motives*, tendencies springing from *several distinct and very different propensities*, cooperate harmoniously and successfully. . (7, pp. 132 f) (Italics mine)

From this passage and many like it it seems to me that McDougall does regard purposes as fixed and constant streams of energy.

Bertocci believes that what I call functionally autonomous motives are only *proximate*—"the means which the ultimate motives have found in their struggle for satisfaction." What I see as the growing independence of a motive from its source he views as a mere transfer of instrumentality from one ultimate motive to another. "Mechanisms which served one master well may in time serve another master even better (or worse)." Or, "in McDougall's terminology, the sentiment which was once a focus for the expression of given instincts may become quite different in aim and in character as it becomes the new means of expression for other propensities." Now, if interests and sentiments can be passed around from propensity to propensity (instead of constituting, as I maintain, ultimate facts of motivational structure) it is fair for me to ask what psychological cement holds a sentiment together? I had supposed that according to McDougall's theory a sentiment is anchored to one or more instincts. If this is so, how can it be detached and passed around—unless indeed it has some organization of its own? If the sentiment is detachable from the propensity must it not have some degree of functional autonomy? If so, Bertocci has admitted my point, even though he may choose to hold to instincts as an *additional* factor in motivation.

The next issue raised by my critic betrays a defect in my previous exposition: "Why don't all old mechanisms become self-sufficient drives? Why does the ex-sailor have a present hankering for the sea but not for his captain, his boat, and a multitude of other objects of early instrumental value?" I reply, the functional autonomy which a motive may demonstrate was never intended to indicate autonomy of the Self, or ego. Mechanisms do not become drives unless in so doing they produce some satisfaction for the *person* (though not necessarily for an innate purpose planted by Original Nature within that person). I can readily endorse Bertocci's statement that functionally autonomous motives do not form themselves in a person unless they "serve the present status of his 'drive development.'" I regret ever implying (to some readers) that motives fly off at a tangent and have no bedrock anchorage in the satisfaction of the ego. In spite of my stress upon the importance of self-esteem, my assumption of a 'will-to-live,' and, more specifically, my discussion (Ch. VIII) of the 'extension of the self' my exposition seems to have been faulty. Motives, I contend, may be autonomous in respect to their origins but never in respect to the ego.

When are we to tell whether a motive is to be regarded as functionally autonomous of its origins? Bertocci as well as other critics has raised this question. The reply, I think, is that the plasticity of the organism under conditions of learning is such that in any given case of a mature individual *unless proof to the contrary is forthcoming all motivational systems that can be empirically identified should be regarded as autonomous of their origins.* It is obvious that on occasion infantile structures persist and serve a somewhat neurotic function in the adult personality. It is obvious too that sneezing, sleep, elimination, and like bodily functions persist throughout life with relatively little personalizing. Furthermore, if one *wishes* to take the biological functions of feeding, anger, sex, fear, stripped of all their individual variability and regard them as abstract categories of motivation—they too may be regarded as unchanging potentialities. But most *concrete* motivational systems, I submit, are individually in-

tegrated with unique emotional patterning and peculiar object attachments As such they differ from person to person and from one period of an individual's life to the other.

Bertocci criticizes me for using the phrase 'permanent interests of personality' In my sphere of discourse this phrase is intended merely to convey the undisputed fact that in the course of life, sometimes earlier, sometimes later, an interest (sentiment, value, trait) may become essentially fixed in its organization, remaining in that form because it produces adequate satisfactions for the person who in adulthood finds himself in a fairly stable environment and in possession of the basic psychological systems that are to serve as his *modi vivendi*. The standardization of a personality at thirty, and in some respects earlier, seems to be a fact, and I think, therefore, that no paradox is involved between the principle of functional autonomy and the assumption of 'permanent interests.'

A final word about habits. Like James, Dewey, Woodworth and the behaviorists, I place relatively more stress upon the driving power of habits than do Bertocci and McDougall. But it is not that I believe each one to be a self-sufficient dynamo Habits may remain instrumental or they may turn into interests. While 'on the make' most habits seem to *be* interests. After a time they either slip into a state of mere instrumentality, or else, as Dewey points out, become integrated into new motivational systems that are forming. It is not, I think, particularly pertinent for Bertocci to ask what habits are 'on the make' *for*. As I have indicated previously conative perseveration as represented in task attitudes—*e g*, learning to drive a car—is a dynamic condition simply because it is accepted by the individual as 'something to be done.' Tasks once accepted are always ego-involved, but for many reasons and in many ways. It is not necessarily their 'instinctive' appeal that makes them accepted. They may be accepted because of suggestion, previous habits of obedience, simple association with the routine of living, or any other mode of involvement in the developing ego.

Bertocci tears to pieces some of my illustrations of functional autonomy. But I am not dismayed. He asks how we are to know that the ex-sailor did not find other satisfactions than the nutritional at sea; so that today, although the need for making a living is no longer present, he is still in love with the sea for the satisfaction it brings to his instincts of submissiveness, self-assertion, curiosity or gregariousness. We are not to know that this is *not* the case, neither are we to know that it *is*. In this particular illustration I am, of course, assuming that the sentiment is a motive in its own right I cannot prove it When Masefield wrote, "I must go down to the sea in ships," he too felt that he was expressing an ultimate, not merely a proximate, motive It seems to me, as I have previously indicated, that it is more reasonable to take a motive at its face value, to assume that it is pretty much what it seems to be, *unless* proof is adduced that instincts are actually at the basis of the motive, or that it is sustained by some infantile fixation. These demonstrations, I submit, are rarely forthcoming

VII. Continuity within Personality

Bertocci's remaining objection to functional autonomy is that it fails to account for unity and continuity within personality. My critic fears that without a hormic base the doctrine of functional autonomy may come to stand for an assembly of separate and self-active faculties, thought to govern behavior all by themselves without interference. I hope I have met this objection by admitting that all motives imply some form of ego-satisfaction. I agree with Bertocci's statement that "the constancy of a trait is determined not by its own self-sufficient energy, but by its capacity to satisfy the total needs of the psychophysiological organism" Let me add, however, that to my way of thinking, these 'needs' are not instincts, nor any other de-personalized desires, but rather whatever integral demands the individual organism happens to have. To be sure no motive ultimately runs itself; it serves the organism But the organism is, after all, but a living system of interdependent motives Hence it

comes about that evolving motives reconstitute the ego even while dependent upon it for their viability

The view presented by the hormist differs. The ego is not reconstituted. It remains forever the same. The picture is one of an eternal *élan*, running its course in pre-established channels, thereby guaranteeing the essential fixity of the individual life. One consequence of this view is the necessary belief that instincts, which are common to the species, serve as identical cores in all personalities, so that all personalities are at bottom the same. My preference is for a more individual view of personality. Its identity is its own, guaranteed not by unchanging purposes, but by *sui generis* motivational systems, some more or less permanent (especially in adulthood, when the subjective sense of unity is at its maximum). Its identity is guaranteed likewise by individual threads of memory, habits of expectation, recurrent plans, hopes, and ideas of future goals. These and other psychological processes discussed in Chapter 13 of my book seem to me to provide adequately for all the unity any life possesses. It is, as this chapter points out, easy to over-state the degree of integration in personality. I fear that the hormist by putting his stress on permanent instincts does in fact overstate the case. In so far, however, as he puts his stress on the 'sentiment of self-regard' (as McDougall sometimes does), he seems to be moving in the direction of functional autonomy, for this sentiment can most reasonably be viewed as constantly in the process of restructuration.

VIII. SENTIMENTS *versus* TRAITS

The final section of Bertocci's critique should be considered along with another of his recent papers (5). He states his willingness to accord a prominent place to both *traits* and *attitudes* in social psychology, and proceeds to work out a plan for co-ordinating these concepts with *sentiment* and *instinct* as defined by McDougall. His plan briefly is this. Let instincts be acknowledged as *ultimate* prime movers, the mainsprings of energy behind all behavior, but let it be admitted that unique organizations of instinctive energy take

place in the course of each life-history so that we may for many purposes of analysis be content with a *proximate* picture of motivation, in terms of sentiments, attitudes, and traits.

Among the proximate motives the most dynamic are the *sentiments* which are compelling organizations of love and hate. It is characteristic of the sentiments that they beget lively emotions (not merely an attitudinal feeling of favor or disfavor), and that their symbol-attachments are personalized or personified (wife, mother, country, God, Hitler, sin, etc.).

Attitudes are less dynamic, representing mere postures of feeling for or against. They are secondary in importance. Though like the sentiments in being *proximate* motives, they stand farther down a dynamic continuum, being less driving and more *directive* in character (less energizing and more instrumental), they are not laden with emotion but only with feeling. "In sum, then, sentiments are aroused (we are driven) when the objects of the environment are seen as imminent, effective (or enduring) friends or foes, through personalization or ego-involvement, while attitudes are aroused (we are favorably or unfavorably disposed toward) by the multiplicity of objects and ideas which are neither of great promise or portent (less personalized, less ego-involvement)" (5, p 252).

Finally, in his system Bertocci introduces *traits*, representing 'a stage of development beyond the sentiment, though influenced by sentimental organization.' A trait would be 'the manner in which many past expressions of propensities have transformed the individual' and be 'uniquely expressive of their form of adjustment rather than of the environment.' In short, traits are needed because sentiments do not adequately represent the persistent and continuously functioning characteristics of the individual's adaptive and expressive history. Dominant, greedy, courteous, ruthless, grave, pessimistic *manners* of conducting oneself are 'residues' of past expressions of propensities and must be admitted as a development beyond sentiments, having no specific objects of attachment, but representing still 'one of the levels at which the hormic energy organizes itself in the life of a given individual'

In reply to this ingenious scheme for structuring the personality I may say that with one of its principal features I fully agree, and that is with the view that attitude, trait, and sentiment are all indispensable concepts. I agree likewise in giving sentiment an especially prominent place in the psychology of personality for it is with hierarchical and lasting organizations that we have here to deal But whether the *term* sentiment is always to be used is not so clear In one passage in my book I wrote, "After the level of infancy is passed primitive segmental drive rapidly recedes in importance, being supplanted by the more sophisticated type of motives characteristic of the mature personality, and commonly represented by such terms as *interest*, *sentiment*, *value*, *trait*, *ambition*, *attitude*, *taste*, and *inclination* Obviously none of these motives are found full-fledged in the newborn child" (2, pp 113f.). Thus it seems there are many terms available for expressing the dynamic unit we have in mind. Because no other generic term was available I have designated this *class* of structural units as *traits* Perhaps my choice was not the wisest, but from my point of view a sentiment is one form of trait. All the units listed in the above quotation have essentially the properties of traits as set forth in Chapters XI and XII of *Personality*. Although the principal properties are the same, yet there are slight differences so that in some contexts *value* fits best, in some contexts *interest*, in some *sentiment*, in others one has no alternative but to use the simple term *trait*. This last term, then, is used by me generically as referring to several kinds of motivational units differing only slightly from one another; or else it is used to designate a motivational integer for which no other special term is available (*e g* , 'stylistic traits').

Bertocci's suggestion that sentiments have more 'driving' power than attitudes is partly acceptable to me General usage would seem to favor this suggestion. Difficulty arises, however, in cases where the motivational complex is well integrated and contains both sentimental and attitudinal features In such a case I believe it does violence to the organized character of the motive to insist upon the distinction

he proposes. For example, a young man is heart and soul bent upon becoming a doctor. As I see it this goal may represent a simple, integral fact of motivation in his personality. It would falsify this organization to dissolve it into a component sentiment (*e g*, love for suffering humanity), an attitude (*e.g*, liking for materia medica), and a trait (*e g*, a friendly manner). It is much better in this case to scrap all these three terms and speak only of an *ambition* (In the generic sense, of course, the *ambition* is itself *a trait*)

We need diversity and flexibility in our terminology respecting motives. Sometimes we may speak more appropriately of *sentiment*, sometimes of *attitude*, or of *trait*. (There are borderlines where all three seem equally appropriate, as when we speak with propriety of a sentiment, attitude, *or* trait of *patriotism*.) Or we may, if the case requires, employ such terms as *value*, *frame of reference*, *ambition*, *taste*, *inclination*, *interest*. For careful thinking in the sphere of motivation these terms should all be distinguished from one another. Elsewhere I have attempted to contribute something toward this clarification of terminology, but do not need to repeat my thoughts on the subject here. (See **1**, pp. 806–810, **2**, pp. 290–295, **3**, pp. 23–25)

Although these distinctions are not unimportant, what matters most to me is that *all of these units of motivational structure be regarded as dynamic*, *unique*, *personal*, *and ultimate* Hence I cannot accept Mr. Bertocci's proposal to regard them as merely 'proximate' factors in motivation. He has given his arguments for wishing to stand by McDougall's propensities as 'ultimate' causes. I have given my reasons for not wishing to do so. Respecting the immediate structural components we agree quite well. If only he would not insist upon viewing these components (which are all that can be established empirically) as proximate! To my way of thinking they offer as *ultimate* a representation of human motivation as psychological knowledge today warrants.

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THE EGO IN CONTEMPORARY PSYCHOLOGY[1]

Reprinted from *Psychological Review*, 50, No. 5, September 1943, 451-478

I Introduction

One of the oddest events in the history of modern psychology is the manner in which the ego (or self) became side-tracked and lost to view. I say it is odd, because the existence of one's own self is the one fact of which every mortal person—every psychologist included—is perfectly convinced. An onlooker might say, "Psychologists are funny fellows. They have before them, at the heart of their science, a fact of perfect certainty, the one warrant for the being of all other things, and yet they pay no attention to it. Why don't they begin with their own egos, or with our egos—with something we all know about? If they did so we might understand them better. And, what is more, they might understand us better."

Back in the 1880's, of course, it was good form for James, Royce, Dewey and their contemporaries to speak freely of the ego, the self, or even the soul. The soul, to be sure, was giving way under Wundt's onslaughts, and everyone was finding it exhilarating to shake off the alleged 'theological domination,' and to emerge unfettered and positivistic into the era of the New Psychology. They forgot that their predecessors had not endorsed the soul because of their theological leanings, but rather, because associationism did not recognize or explain to their satisfaction the *coherence*, *unity*, and *purposiveness* which they thought prevailed in mental life. Granted that the 'soul' also failed to explain these properties, it at least called attention to their existence.

After the expulsion of the soul, these unifying properties of mental life were occasionally referred to under the designa-

[1] President's address to the 14th Annual Meeting of the Eastern Psychological Association, Hunter College, April 30, 1943.

tion of 'self' For a time, thanks to James, Calkins, Prince, and the French psychopathologists, 'self' was a reasonably popular concept. But gradually it too fell into disuse.

The total eclipse of soul and the partial eclipse of self were due in part, as I have just said, to the rise of positivism in psychology Positivism, we all know, is a scientific program for moral re-armament, whose imperatives include absolute monism, absolute objectivity, and absolute reductionism—in short, absolute chastity. From this ascetic point of view, subjective certainties are suspect, selves seem a bit indecent, and any hint of metaphysics (that is, of non-positivistic metaphysics) savors of laxness As Gardner Murphy pointed out to this Association one year ago there was no prestige to be gained from a psychology of the self (39).

But for all its sumptuary control, positivism had one undisputed merit it engendered a wholesome dislike for question-begging explanations Much of the older psychology, it showed, suffered from a tendency to labor over words as if words were the essence of things. Thanks to positivism faculty psychology, resting as it did on verbal realism, became discredited, and dialectics fell into disrepute. Much of self-psychology, we must now admit, dwelt on the unenlightening plane of dialectics Its statements were often redundant or circular. In the manner of Gertrude Stein it sometimes asserted that a self is a self is a self Not being, by nature, especially lyrical, psychologists failed to see any deeper significance in this exalted formula Quite understandably they refused to admit such a stammering self to the gray citadel of their laboratories

But when a concept becomes taboo it is probable that the taboo will irradiate to cover a whole range of problems associated with the concept. Something of this sort seems to have happened. It is not only the soul and the self that suffered ostracism, but along with them a vast array of problems having to do with the coherence and unity of mental life, with pride, ambition, and status, with values, ideals, and outlook on the future. The eclipse, of course, has not been total, but it has been considerable.

As if to compensate for the neglect of these interests within the field of psychology proper, psychoanalysis rose upon the horizon emitting a spectacular, if sporadic, light. Small wonder that the world at large turned to psychoanalysis for guidance in dynamic psychology. There was precious little other guidance to be had. I am inclined to believe history will declare that psychoanalysis marked an inter-regnum in psychology between the time when it lost its soul, shortly after the Franco-Prussian War, and the time when it found it again, shortly after World War II.

Until psychoanalysis becomes finally fused into a broader and more adequate psychology, it may take pride in having preserved and advanced the study of certain functions of the self that positivistic psychology had consigned to oblivion. It may take credit too for preserving one term, more or less cognate with 'self,' from the dark taboo of which I have spoken. 'Ego' has featured prominently in psychoanalytic literature from its beginning. This term I am now appropriating to signify the recentering that is taking place in psychological theory.

But it is not from psychoanalysis alone that we draw our threads. The position of the ego in contemporary psychology is determined by certain other historical trends as well.

II. Main Conceptions of the Ego

Among the different conceptions of the ego found in psychological literature the following are certainly the most important.

1. *The ego as knower.* The nominative form of the word ego implies that some subject is busily engaged as Brentano would say in 'intending' his relations to the universe. The problem of the knower or 'Pure Ego' has been of little interest to psychologists since James gave it his lengthy *coup de grâce* in the *Principles*. It is enough, says James in effect, to admit that knowing goes on. A separate knowing-ego is not a necessary assumption. For phenomenologists (**4, 42**) and personalists (*e.g.*, **37**), of course, the problem of the subject-object relationship remains uppermost. But for the

most part, since the time of Brentano and James, psychologists have passed the problem by.[2] For our purposes, we need only record this first usage, and note its relative rarity.

2. *The ego as object of knowledge.*—Some investigators have set themselves the problem of the nature of our experience of the self (2, 22, 33). This approach, limited as it is to the deliverances of introspection, has not been particularly rewarding. It yields relatively unenlightening localizations for the ego which is felt to lie 'between the eyes,' or to consist of 'motions in the head,' or to be situated 'between right and left,' 'between up and down,' 'between behind and before.' Following this line of investigation Horowitz came upon such a diversity of results (reports locating the ego in the head, heart, chest, face, brain, genitals) that he concludes "the localization of the self as it is reported in the literature quoted, in the responses on our questionnaire, in informal discussion, in the investigation of children, is not the basic phenomenon one might hope for to ease an analysis of the structure of the self and personality" (22, p. 386).

There seem to be only two facts upon which there is general agreement. (1) Infants, all writers concur, do not recognize themselves as individuals; they behave in what Piaget calls an 'undifferentiated absolute' composed of self and environment. Only gradually and with difficulty does a segregated ego evolve. (2) The ego of which we are aware is variable in its dimensions. Sometimes it includes less than the body and sometimes more. In a semi-doze we lose all sense of our egos though we may be conscious enough of impersonal items. Our feet perhaps are suddenly perceived as strange objects not belonging to us. In pathological conditions, we know, remarkable experiences of depersonalization take place (7, 10). Conversely, we sometimes think of a tool we are using as parts of our extended ego-system, and at

[2] Private correspondence with Koffka concerning his own usage of the term brought out the interesting fact that in writing his chapters on the ego he had never thought of ego in the rôle of the knower (28). "To be quite frank, I never put this question to myself." He adds, "That my solution will be similar to Brentano's I doubt. At the moment it seems to me that it will be found in the theory of Ego subsystems, more particularly in the relation of the Self-system to other Ego-systems."

times we regard our children, our lodge, or our ancestors as an intimate part of our extended selves. It is agreed that in this manner the ego-systems of which we are aware contract and expand in a most variable fashion (33).

3. *The ego as primitive selfishness.*—A century ago Max Stirner wrote *Der Einzige und Sein Eigenthum* (49), a volume in which he developed the thesis that man is by nature unalterably egoistic. In 1918 the French biologist Felix Le Dantec handled the same theme more brilliantly in his *L'egoisme seule base de toute société* (29). Unquenchable egoism is the foundation of the social edifice, says Le Dantec, and hypocrisy is its keystone. Psychologists are partial to such hard-headed realism, and have themselves gone far in unveiling the hypocrisy in man's nature. Projections, rationalizations, defense mechanisms have been exposed for what they are—the whitewashing of ego-centric motivation. During this century psychologists have joined with historians, biographers, novelists in the fashionable sport of debunking human motives.

4. *The ego as dominance-drive.*—Related to this view of primitive egoism, we find many investigations that deal with dominance feelings, with ascendance, with pecking orders, with euphoria. From this point of approach the ego is that portion of the personality that demands status and recognition. The negative states of anxiety, insecurity, defensiveness, resistance are just as truly indicators that whenever the ego is debased there arise impulses for its defense and restoration to status.

5. *Ego as a passive organization of mental processes.*—Psychoanalysis, we all know, has contributed much to the interpretation of human nature in terms of egoism. Its whole theory of motivation is based upon the assumption of hedonistic self-interest. But in psychoanalysis egoism, oddly enough, is not ascribed to the ego, but to the urges arising from the id. For Freud the ego proper is a passive percipient, devoid of dynamic power, 'a coherent organization of mental processes' that is aware of the warring forces of the id, super-ego, and external environment (16). The ego, having no

dynamic power, tries as well as it can to conciliate and to steer the warring forces, but when it fails, as it often does, it breaks out in anxiety The ego is born of restraint of the instinctual impulses, and it continually needs strengthening But even when through the analytic process it is strengthened, it is still essentially nothing more than a passive victim-spectator of the drama of conflict

Dissatisfied with Freud's denial of dynamic power to the ego, we know that later psychoanalytic writers, French (**14**) and Hendrick (**20**) among them, have ascribed more *momentum* to the ego It is the agent that plans, that strives to master as well as to conciliate the conflicts. One analyst, Heinz Hartmann, departing considerably from Freud, holds that "adaptation to reality—which includes mastery of it—proceeds to a large extent from the ego and in particular from that part of the ego which is free from conflict; and it is directed by the organized structure of ego-functions (such as intelligence, perception, etc.) which exist in their own right and have an independent effect upon the solution of conflicts" (**18**, p 214). To such writers the ego-ideal is no longer, as it was with Freud, a passive reflection of the superego, which in turn is conceived as a mere legacy of the parent The ego through its ideals reaches into the future, becomes an executive, a planner, a fighter

6. *Ego as a 'fighter for ends.'*—We are brought then, by some of the more modern psychoanalysts to a position not unlike that of McDougall, or of James in his more teleological moments For McDougall self-regard was the master and controlling sentiment in whose interest all other sentiments function (**34**, p 383). The phrase 'fighter for ends' I borrow from James (**25**, I, p. 141), who at times was intensely dynamic and personalistic in his conception of the self.

The purposive view of the ego may be linked to Koffka's postulate that there is ever active "a force which propels the ego upwards" (**28**, p 670) The position is represented too in those dynamic psychologies that recognize the subservience of the biological drives to one central drive of ego-satisfaction. One of the most forceful expressions of this point of view

is to be found in Goldstein's *Human nature in the light of psychopathology.*[3]

7 *The ego as a behavioral system.* In spite of his postulation of "a force which propels the ego upwards," Koffka's position is characteristically somewhat less dynamic than that just described. The ego, he says, is only one segregated system within an homogeneous field. Much behavior occurs with no reference to the ego. Not all perception, not all action, not all emotion, not all consciousness, are related to an ego-system The ego varies widely in its boundaries from time to time, and under certain circumstances acts as a system which determines the course of events as does any other dynamic system according to the theory of Gestalt But much of the time behavior is free from the influence of an ego-system.

More influential because of its experimental fruitfulness is Lewin's treatment of the subject (31, p 181). Although he seldom uses the term ego he too allows for a central subsystem within the person. Not all behavior is ego-linked, but many kinds of experimentally obtained results cannot be accounted for without referring to the special types of tension that exist whenever the ego is 'engaged' The shifting aspiration level is, most obviously, a phenomenon of ego-tensions Satiation, substitution, encapsulation, resistance, irreality, power-field are among the Lewinian concepts whose characteristics represent various properties of ego-tensions [4]

It is clear that Lewin, no less than Koffka, wishes to avoid thinking of the ego as a single entity, and prefers to regard it

[3] "On the basis of our discussion I believe we are in no way forced to assume the existence of special drives They are special reactions in special situations, and represent the various forms by which the organism as a whole expresses itself The traditional view assumes various drives which come into the foreground under certain conditions We assume only one drive, the drive of self-actualization, but are compelled to concede that under certain conditions the tendency to actualize one potentiality is so strong that the organism is governed by it" (17, pp 144 f)

[4] A particularly suggestive contribution of Lewin pertains to the difference between nationalities in terms of the relative ease with which the ego becomes 'engaged' Thus the American is less defensive, less touchy, less reticent than the German, due to the fact that the barriers of the German's ego lie near the 'surface' He protects himself against familiarity and intrusion, whereas the American leads a much more 'public' life and protects only the 'core' of his personal life from public gaze (32)

as the variable set of forces that are aroused whenever the person enters into some novel and perhaps dangerous relation to his environment

8 *Ego as the subjective organization of culture* In recent years, as everyone knows there has been a drawing together of psychology, psychoanalysis and social anthropology The resulting commensalism has produced a new conception of the ego The picture of the selfish and unsocialized ego bequeathed us by Stirner and Le Dantec has been broadened Sherif, for example, points out that although the ego is a 'genetic psychological formation,' yet it is acquired by the child under the ceaseless impact of influence by parents, teachers, and associates, with the result that we must say that the ego "is chiefly made up of social values" (48, p. 179). Since the process of segregating the ego in childhood is achieved largely by giving the child a name, a status, a code of behavior, a social sense of guilt, and social standards for making his judgments - Sherif concludes that the ego is nothing but the social part of man (48, p 186). This author's position is extreme, for if the ego is nothing but 'the social in man,' one wonders what to call all the anti social impulses and the solitary strivings that are normally called *egoistic*? Cantril's view is similar to, but less extreme than, Sherif's. Cantril admits that "a person's ego and, consequently, the way in which he regards himself, are by no means always entirely bound by the surrounding culture" (5, p. 44) But yet what an individual regards as himself is undeniably, in large part, socially determined. When his nation's flag is torn down *he* is insulted, when disparaging remarks are made of his parents, *he* is involved; when his political candidate loses a contest, *he* has been defeated.

By stressing the cultural content of the ego, these authors in effect eradicate the artificial Freudian distinction between ego and superego They also rescue the ego from the anti-social solipsism of Stirner and Le Dantec and make of it a socialized agent ready to enter as an integrated unit into the complex relations of social life

From this historical glance I have omitted many writers

who have made their contribution to the literature of the ego But, nevertheless, I believe, I have mentioned the chief ways in which, up to now, the ego has been conceived, viz., (1) as knower, (2) as object of knowledge, (3) as primordial selfishness, (4) as dominator, (5) as a passive organizer and rationalizer, (6) as a fighter for ends, (7) as one segregated behavioral system among others, (8) as a subjective patterning of cultural values.

The question immediately arises as to whether these eight uses of the term ego have anything in common, or whether, as is often the case, a single term is allowed to obscure entirely different problems Is the ego as knower the same ego that seeks status? Is the me that is known also a fighter for ends? Has the ego system proposed by Koffka any kinship with Freud's ego who attempts through insight to reclaim the id?

These are questions that cannot yet be answered. We cannot say whether these eight conceptions reflect irreconcilable theories, whether they shade imperceptibly into one another, or whether they are all ultimately to be subordinated under one inclusive theory of the ego

In favor of the last possibility I should like to point to recent experimental studies which, if I mistake not, lend support to several of these conceptions simultaneously The experiments result in one common finding, namely, that ego-involvement, or its absence, makes a critical difference in human behavior When a person reacts in a neutral, impersonal, routine atmosphere, his behavior is one thing But when he is behaving personally, perhaps excitedly, seriously committed to a task, he behaves quite differently In the first condition his ego is not engaged, in the second condition it is. And it is my belief that in most of the experiments I shall report one finds that the ego is acting in several, if not all, of the eight capacities I have listed In other words, *ego-involvement* is, as the phrase implies, a condition of total participation of the self—as knower, as organizer, as observer, as status seeker, and as socialized being But now for the experimental evidence.

III Experimental Evidence

1. *Generality and specificity* — A few years ago I found myself involved in a controversy in the field of personality. Certain experimenters claimed that their findings demonstrated a situational specificity in human conduct. For example, a child, honest in one situation, would not be found honest in another (19); a person confident of one judgment would not be confident of another (53). Whole books were written in defense of specificity (50) Other investigators, by other methods, found a person honest in one situation to be honest in another (35), a person confident in one judgment to be confident in another (26), and whole books were written in defense of generality (1) It was a pleasant battle while it lasted An arbitrator arose, a peacemaker by temperament — Gardner Murphy was his name—and he proposed a compromise "Honesty," he suggested, "is either a general characteristic or a set of specific habits, depending on your interest and your emphasis" (38, p. 385). Murphy was right, but it was not until recently that the deciding interest and critical emphasis became clear at least to me. For my own belated insight I am indebted to an experiment by Klein and Schoenfeld (27)

These investigators gave to a group of subjects a series of mental tests under two experimental conditions. In the first, the atmosphere was neutral, dull, *non ego-involved* The workers were merely laboratory subjects going through routine motions After each of the six tests they were required to rate the degree of confidence they felt in the accuracy of their performances. Between the six tests there was little consistency in these certainty ratings. After an interval of time, a second equivalent set of tests was administered and the atmosphere was markedly changed The subjects were placed under greater strain, were told to try hard since the results of these 'intelligence' tests would be entered on their college records The shift in atmosphere was effective. The confidence ratings became markedly consistent A student who felt assured in one test felt assured in the other five,

whereas a student who lacked confidence in one of his performances generally lacked confidence in the other performances. The authors conclude that confidence is a personality trait when the ego is involved, but that it is specific to each situation when the subject has no deep interest at stake.

This experiment supplies the hypothesis needed to settle a long-standing controversy. When there is ego-involvement there are general traits; when there is no ego-involvement there are no general traits.

From an entirely different source comes evidence of the same type. In connection with its polling investigations the Office of Public Opinion Research has found that *intensity* of feeling goes with *consistency* of opinion (6, Ch. 3). For example, in the pre-Pearl Harbor era it was found that those who felt most intensely in favor of aid to Britain were, by and large, those who endorsed all sorts and varieties of interventionist propositions. On the other hand, those who were lukewarm in their support of aid to Britain were far more inconsistent and specific in their answers. Sometimes they gave interventionist, and sometimes isolationist, replies. The measure obtained between the intensity scale and the generality of the attitude was a coefficient of correlation of +.63.

2. *Judgment.*—Eli Marks worked on judgments of skin-color among Negroes. He found it, in part, to be a function of the objective scale but, in part also, a function of an ego-centric scale. A Negro of medium coloration is likely to be judged dark by a Negro of lighter complexion, and as light by a Negro of darker complexion (36). For decades psychophysicists have dealt with judgments of hue as a function of wave length, but Marks makes clear that judgments of hue may be also a function of one's sense of social status. Wave length is perceived by the sensitized retina, but it is perceived no less by the sensitized ego.

In the field of simple predictive judgment, it was found in the public opinion polls of 1940 that of the people who were strong Willkie supporters, 71 per cent predicted that he would win the election; of those who were weak Willkie supporters,

only 47 per cent made this prediction (6) Assuming as we must that intensity of an attitude indicates ego-involvement, we find here a clear quantitative demonstration that a 24 per cent difference in the number of predictions exists when the ego-regions of the presonality are engaged Admittedly, the ego's wish is only one factor in predictive judgments, but if conditions are right it can become the crucial factor as it did in these 24 per cent.

Polling research has uncovered yet another important fact concerning judgment. If you ask respondents to tell you to your face what they think about our allies, the British, or about some minority group in this country, or even about their own educational level, you obtain one set of results; but if you ask them to write their answers to the same questions privately and deposit them in a padlocked ballot box, on the average your results will be significantly different (6, Ch 5) Now this difference between open and secret expressions of opinion seems to exist only when the answers might jeopardize the respondent's sense of status or affect his prestige in the interviewer's eyes. The discrepancy is great enough to warrant the use of secret balloting whenever questions are of a type that might expose the person to humiliation

Judgments concerning one's self are remarkably interesting things to study We know, for example, how inaccurate people are in rating their own economic status Nearly all prefer to overlook the objective evidence and to identify themselves with the great middle class (6) We know something about the distortions that result when people report their own traits Frenkel-Brunswik found the self-protective devices so powerful that her subjects would omit, justify, or completely reverse the facts, in their accounts of their own deficiencies (13). Although it is trite to point out what all psychologists know so well, that lack of objectivity is the rule when our egos are involved, yet it is not trite to remark that very little work has been done on the extent and nature of the distortion, nor upon the curious and momentous question why it is that some personalities attain objectivity even in

the face of extreme ego involvement. Insight, it would seem, grows more and more difficult to achieve as the inner regions of the personality are approached. And yet some individuals accomplish remarkable feats of self-objectification. Why do they succeed and others fail?

3. *Memory*. - Thanks to Bartlett we know how cultural schemata alter our memory traces (3). Here, of course, is an example of the silent influence of an ethnocentric frame. But within any given culture striking memory-efforts can be traced to egocentric frames as well.

Edwards has demonstrated that if memory material fails to fit comfortably into an ego-involved frame, it contorts itself until it does so. Using three groups of students, each with a different attitude toward the New Deal (favorable, neutral, or opposed) he first read them a 10-minute passage concerning the relations of the New Deal to communism. The subjects knew they were to be tested for the accuracy of their retention.

> Immediately after the reading, a multiple choice recognition test consisting of 46 items was given to the subjects. Half or 23 of the items on the test were answered in the passage in a manner favorable to the New Deal, the other 23 were answered in a manner unfavorable. The items on the test offered opportunities for rationalization of one's answer, if the correct answer was opposed to one's attitude. The subjects were re-tested after an interval of 21 days.
>
> Analysis of variance of the data showed that rationalization was directly associated with the degree of conflict between the correct answer and the attitudinal frames of reference of our subjects. In general the results show—as do many other studies—that it is almost impossible to expect objectivity and accuracy in perception, learning, remembering, thinking, etc., when ego-involved frames of reference are stimulated (9, p. 234).

Here one might cite also the memory experiments of Zillig which show how members of the male sex recall fewer aphorisms favorable to women than to men (58). Or, the Watson and Hartmann study concerning the distortions that occur in memory for theological arguments depending upon the subject's previous commitment to atheism or to theism (56). Or, Wallen's ingenious demonstration that after an interval of time subjects recall ratings of their own personalities in a

manner that makes them compatible with their own preconceived opinions of themselves (54).

In a recent investigation Levine and Murphy demonstrated that pro-Communist sympathizers memorize pro-Communist textual material more easily than they do anti-Communist textual material (30) What is more, they forget the antipathetic text more rapidly and more completely than the sympathetic text In anti-Communists the effects are exactly reversed. It was a brilliant stroke for these authors to demonstrate in one experiment that both learning and forgetting are functions of the political identifications of the ego.

4 *Frame of reference* –Some of the studies I have mentioned have been conducted in relation to what their authors have called a 'frame of reference' Now, a frame of reference seems to signify *any spatial-temporal or cultural orientation, that relates many of an individual's attitudes, habits and judgments to one another, and influences the formation of new judgments, attitudes, and habits.* A general orientation favorable to the New Deal will, according to Edwards, determine our specific remembrance of items from speeches concerning the New Deal (8) A general orientation regarding various other subjects, Sells has shown (47), will affect our logical reasoning in all matters pertaining to them

Now it is important to note that not all frames are ego-involved If I locate 9th Avenue or East 12th Street readily it is because I have a geographic frame in mind for New York City In my case this spatial orientation is not at all ego-involved. The point I am making is that research on the problem of frames of reference is not necessarily research on the problem of ego-involvement Many cultural frames having to do with language, etiquette, or dress, determine our perceptions, our memory, our conduct, but their influence is not felt as personally relevant Margaret Mead has expressed her anthropological astonishment at the odd custom Americans have of appearing at her lectures with clothes on; but to most of us this quaint folkway causes no ego-concern, at least as long as it is operative

But an interesting discovery has come to light in these days of war and violence. Certain cultural frames which were previously indifferent have suddenly become acutely personal. Probably no one in Alsace felt concerned about the bilingual frame of reference until the Nazis decreed that only German should be spoken, and that only Germanized names and inscriptions should appear on the tombstones Bilinguality had always been taken for granted, but when this familiar, habitual frame was suppressed and placed under attack, then it became of central importance, and people reacted as to a personal insult. Many of us have recently discovered that hitherto indifferent frames of reference, such as the Constitutional guarantees we enjoy, previously taken for granted, have suddenly become ego-involved, and now in jeopardy are defended as if they were parts of our physical bodies Suppose we in this room were forbidden to speak the English language. How enraged we would become. What had always been a mere ethnocentric frame would immediately become ego-involved

Ethnocentric and egocentric frames both affect our conduct, and, as I have just pointed out, under certain conditions the ethnocentric frame is experienced also as an egocentric frame But I think it is a mistake to confuse the concept of the ego with that of the socius (or cultural portion of our personalities) as Sherif has done. Under normal social conditions only a relatively small portion of our culture is ego-involved.

5 *Learning.*—The longest and most difficult chapter in psychology, no one will deny, is the chapter on learning. The latest Yearbook of the National Society for the Study of Education is devoted entirely to this subject (41). One searches its 463 pages in vain for any mention of the ego, and almost in vain for any recognition of the importance of *interest.* True, one finds occasional remarks to the effect that "the teacher who neglects the simple but powerful word of praise does so at her pedagogical peril" (41, p. 118), but the potential significance of such remarks for learning theory seems lost to view.

Clinical, educational, and industrial psychologists know that the first rule of all applied psychology is that every child and every adult needs some experience of success and social approval John E. Anderson advises the teacher to go far out of her way if necessary to find an area in which these feelings can be engendered, and he adds

Success in one area may more than compensate for failure in many areas, some accomplishment furnishes an integrating center about which the personality may be integrated (41, p 349)

Note especially Anderson's statement that "success in one area may more than compensate for failure in many areas." Only in terms of ego-psychology can we account for such fluid compensation. Mental health and happiness, it seems, does not depend upon the satisfaction of *this* drive or *that* drive, it depends rather upon the *person* finding *some* area of success *somewhere*. The *ego* must be satisfied, not the hunger drive, nor the sex drive, nor the maternal drive, however temporarily insistent these segmental tensions may be.

Now most theories of learning lean heavily upon the assumption of multiple drives. A segmental tension exists, the organism behaves, the tension is relieved, and the response set. In this sequence it is often assumed that all drives are equally potent for learning The satisfaction of any drive, through the principle of reward or confirming reaction, is held to bring about an equal degree of learning If this is so, how can we account for the fact that praise is found almost uniformly to be the leading incentive in school, in factory, and in ordinary life? If we are to hold to the theory of multiple drives at all, we must at least admit that the ego-drive (or pride, or desire for approval—call it what we will) takes precedence over all other drives.

Not only does human learning proceed best when the incentive of praise and recognition is used, but the individual's *capacity* for learning actually seems to expand under this condition Every psychometrist knows that in order to obtain a valid I Q the subject must be encouraged. Terman's instructions on this point are well known.

Nothing contributes more to a satisfactory *rapport* than praise of the child's efforts . . . . In general, the poorer the response, the better satisfied one should appear to be with it . . . . Exclamations like fine! splendid! etc., should be used lavishly (52, p. 125).

In other words, to maximize the child's intelligence we must maximize his ego. For psychological theory this is really a momentous fact. Intelligence is the ego's tool for solving its own problems. It is manifestly unfair to estimate intelligence on the basis of performance in which the individual himself has no interest. For this reason, through the device of praise, the subject must be encouraged to make the test-items into ego-involved problems which he can attack with maximally motivated effort. Intelligence is the individual's capacity to solve problems of importance to himself.

There is one unfavorable condition for learning that must be admitted lest we oversimplify the issue. Too intense an ego-involvement may be disruptive. Its normal integrative value may be actually undetermined when eagerness or self-consciousness reach a degree of intensity that lead to embarrassment or over-anxiousness. No one learns or performs well if his autonomic nervous system is in a turmoil. We need a rule that will help us determine the optimum degree of ego-involvement required for enhancing efficiency of learning and performance.[5]

One word about the law of effect. Its principal shortcoming, I think, stems from the assumption that rewarded *responses* tend to recur. Many experiments, in fact, show that rewarded responses do not blindly recur whenever an appropriate stimulus returns. Hoppe (21) points out that people normally do not strive again for a goal successfully achieved. What they do is to raise their aspirations to a point where they clearly risk failure. A student who makes an A record in a course in college, shows no tendency to repeat that course. He prefers to take new risks in the same

[5] One formulation of the needed rule is suggested by French. "So long as the tension does not exceed the available energy of the integrative mechanisms, so long will the integrative capacity of the goal directed striving increase with increasing tension. But as soon as the tension of the need begins to exceed the available energy of the integrating mechanism, the effect of increasing tension will be the opposite" (15, p. 245).

general area. And an experiment by Rosenzweig indicates that it is definitely infantile to choose to repeat successful acts (46). For example, a puzzle once solved, even if accompanied by a burst of elation, no longer attracts the mature individual. He wants new worlds to conquer. Reward may bring merely satiation and boredom.

The fallacy, I repeat, lies in our speaking of rewarding a *response*. The law of effect would be truer if it held simply that a *person*, being rewarded, employs his past successes in whatever way he thinks is likely to bring him satisfaction in the *future*. Israeli has shown that, excepting for certain psychopaths, people are much more interested in their futures than in their pasts (24). Since this is so, an individual's past performances often mean little or nothing to him. Only if the ego would be served thereby, does he engage in a repetition of the successful act. More often he chooses to vary and refine his behavior so that he may feel that he himself is growing toward new successes in the future.

The relation between success and repetition, I suspect, is much closer in the case of non ego-involved behavior than in the case of ego-involved behavior. Over and over again I use the same motor combinations in typewriting, in driving my car, in dealing with tradesmen. They are reasonably successful acts, why should I change them? But I do not repeat successful research work, do not repeat a gratifying conversation with a friend, nor do I re-state the same goal in an aspiration-level experiment. Ego-involved tasks often demand changing goals and new responses. Rewarded behavior, it would seem, becomes stereotyped only in lower animals, or in such human activities of a routine nature that fail to engage the ego.

To summarize this brief discussion, it would seem that in order to employ the law of effect with human learning we must view it as secondary to the principle of ego-involvement. The law of effect, like cue reduction, conditioning, bond-formation, and most other popular principles of learning, have been worked out for the most part on animal subjects or on human beings deprived for the duration of the experiment, of their

egos. The principles may be good ones, but I submit that when the ego is engaged they operate in a contingent fashion. Learning theory of the future, let us hope, will not remain so peripheral to the ego.

6. *Motivation.*—You may be thinking, "But, we've always known that one must be motivated in order to secure a response. Are you talking about anything more than the importance of motivation?" Yes. I am saying that there are two forms of motivation, one ego-involved and one not, and I am attempting by repeated citations from experiments to show the differences that exist between them.

Take, for example, the work of Huntley and Wolff on judgments based upon records of expressive behavior (**23**, **57**). These investigators working independently instructed their subjects to make judgments concerning the personalities of many people from their handwritings, from their recorded voices, from photographs of hands, and from their style of story telling. The subjects were motivated in a routine manner as is any laboratory subject. But, suddenly, in the midst of the series they were confronted with samples of their own expressive behavior which had been recorded without their knowledge. In the large majority of cases the subjects did not consciously recognize their own records and continued innocently with their characterizations. But something had happened. The characterizations began to take a different form. Even though a judge was wholly unaware that a certain expression was his own, he gave it a much more favorable rating than he gave similar expressive records taken from other subjects. Occasionally he gave it a vehemently unfavorable rating, but practically never did he give it an indifferent rating. Other people's records might arouse no affect, but not his. Whenever a subject became half-conscious, as it were, that a record might possibly be his, his judgments were still more intensely partisan; but when he fully recognized his own record then his social sense of modesty prevailed, and his judgments returned to the noncommital level.

In these experiments we have a particularly neat demon-

stration of the fact that ego-involved systems may operate in a wholly silent manner, affecting judgments in a most extreme way without the subject knowing the reason. The experiments also prove that the limen of ego-involvement is lower than the limen for self-recognition, an interesting finding which warns us once more that conscious report and introspection will never be a sufficient method for exploring the operations of the ego-system But the important point for our present purposes, is to note that routine motivation to perform a task is one thing, and that ego-charged motivation is quite another. Routine motives yield one set of results, ego-motives a different set.

When is motivation ego-involved and when is it not? A partial answer seems to lie in the degree of frustration involved. As we have already noted many customary frames of reference are not felt to be personally relevant, and do not behave like egocentric frames, until their continuance is threatened (as in wartime). Many drives, too, run their course without engaging the ego unless they are interfered with But serious frustration may instigate the clamor, the jealousy, the possessiveness, often characteristic of ego-involvement. And yet frustration by no means always produces this effect, especially if one has compensated for drive-frustration by success in other realms And then, to complicate the situation further, we cannot say that ego-involvement is absent when there is no frustration. Many smooth-running instances of goal-seeking behavior are obviously ego-involved. A mother feels just as closely identified with her child when it is in good health as when her maternal care meets with frustration. A business man is as much absorbed in his enterprise in times of prosperity as he is in times of adversity Let us say, then, that frustration of goal-seeking behavior or any kind of threat to the individual, is very likely to engage the ego-system; but that normally this ego-system is made up of the ordinary values which spell out the significance of life to the individual.

7. *The level of aspiration.*—The history of ten years' research on this Lewinian problem is too intricate to trace

here, but unless I am mistaken every investigation has directly or indirectly confirmed Hoppe's initial claim that the subject behaves in such a manner as to maintain his self-esteem at the highest possible level (21). Of course, many investigators have not used the conception of the ego at all. Yet whatever results are found they all seem to point to the essential inescapability of Hoppe's original hypothesis Frank (11) for example, found that subjects in whom 'self competition, and consciousness of social pressure' were present, had D-scores three to seven times as large as did subjects who had no such sense of personal involvement in the situation[6] Frank also found that subjects who are ego-involved do not change their estimates with every little variation in their performance They try and try again before trimming their aspirations to fit their capacities, subjects not ego-involved on the other hand, quickly yield to the immediate realities of the situation, and lower their aspiration level (12) We know too that competitiveness, surely a symptom of ego-involvement, usually produces a rise and greater consistency in the aspiration level (43) But we cannot say that competitiveness always has this effect because subjects who dread competition will lower their level of aspiration consistently in order to avoid the risk of humiliation (11) In short, it seems always to be the ego-demand of the individual subject that determines the behavior of the aspiration level. Some subjects are adventurous, some cautious, their egos demand different types of satisfaction, and it is this fact that is repeatedly reflected in the results of the experiments. It is worth pointing out that historically the aspiration level may well be regarded as the door by which the ego re entered the cloisters of academic psychology.

8 *Industrial psychology.*- Most of us, I suppose, have been impressed in recent years by the demonstrations of Roethlisberger and Dickson (44), of Watson (55), and others, that employees in industry are not 'economic men' so much as they are 'ego men' What they want, above all else, is

[6] D scores, of course, indicate the discrepancy between performance and the goal that the individual wishes or expects to achieve

credit for work done, interesting tasks, appreciation, approval, congenial relations with their employers and fellow workers. These satisfactions they want even more than high wages or job security. Now, the employer's estimate of the worker's wants correlates just about zero with the worker's own report of his wants (55, p. 119) The employer thinks that wages and security are the dominant desires, whereas in reality the ego-satisfactions are primary. What a different outlook there would be on our economic life if we took firm hold on the issues of status and self-respect in industry, and re-planned our industrial society in a manner that would rescue the worker's ego from oblivion

IV. The Nature of the Ego

In the experiments I have cited, and in many others of analogous nature, it turns out that one group of subjects (those who are personally aroused and committed to a task) behave in ways quite unlike other subjects (who are not so committed). In some instances there are measurable quantitative differences as great as 50 or 60 per cent, sometimes much more In other instances there are qualitative changes that elude measurement In short, we are here confronted with some parameter that makes a vast difference in our experimental results.

We have seen that under conditions of ego-involvement the whole personality manifests greater consistency in behavior, reveals not specificity in conduct but generality and congruence In the field of judgment, we have seen how ego-involvement results in significant distortions of the ordinary psychophysical scales. In memory, we find that retention is characteristically superior (though at times repressions also may be more likely to occur, and rationalizations may creep into ego-involved memory) In intelligence, we note that ego-involvement is indispensable if we would obtain optimum performance. In learning theory, reforms seem indicated to make room for the demonstrable influence of the ego upon the acquisition of skill and knowledge. In motivation, the craving for recognition, status, and personal ap-

preciation turns out to be supreme, so much so that our conceptions of procedure and policy in industrial relations, in education, and in psychotherapy, are profoundly affected And these are only a few of the operational criteria by which we may demonstrate the existence of the ego.

Its admittance to good standing in contemporary psychology has been advocated by several psychologists besides myself. Koffka, Lewin, and the psychoanalysts have done so, as has Murray who makes a distinction between 'peripheralist' psychology and 'centralist' psychology (40) The thesis set forth in Roger's recent book *Counseling and psychotherapy* (45) seems to me especially clear evidence that the ego is coming into its own. Rogers, in effect, asks counselors to sit back and with little more than an occasionally well-placed *m-hm*, to encourage the patient himself to restructure and re-plan his life. The patient's ego takes command. It's about time it should.

Although we have given an adequate operational demonstration of the ego, we have not yet faced the difficult problem of definition. Earlier we saw that eight conceptions seem to prevail. But whenever we encounter ego-involvement the ego in several of its historical senses seems to be active. Furthermore, these historical conceptions seem to have much in common.

For one thing, it seems clear that all of the conceptions are less embracing than 'personality.' All writers seem agreed that the ego is only one portion, one region, or as the Freudians say, one 'institution,' of the personality. Many skills, habits, memories are components of personality but seldom, if ever, become ego-involved. Writers seem also agreed that the ego is non-existent in early childhood, evolving gradually as the child comes to mark himself off from his environment and from other human beings. They seem also to agree in viewing the ego as the portion of the personality that is in proximate relation to the external world. It senses the threats, the opportunities, and the survival significance of both outer and inner events. It is that portion of the personality, so to speak, that meets the world head-on It is

the contact-region of the personality. For that reason it is also the conflict-region Yet it is coextensive with neither consciousness nor with unconsciousness, for much that we are conscious of is indifferent to our egos, and many unconscious stimuli silently but effectively engage them.

There is also agreement that the subjective sense of the ego varies greatly from time to time, now contracting to include less than the body, now expanding to include more. Its content keeps changing, for at certain moments the ego seems preoccupied with one activity and soon thereafter with a wholly different activity This shifting scene however does not mean that there is no stable and recurring structure. On the contrary, if you know a person well enough, you find that you are able to predict with marked success what items will and what items will not be linked to his ego By many writers the ego is represented as a layered structure. Certainly there are *degrees* of ego-involvement. A person may be intensely partisan or moderately partisan.

There seems to be one other property of the ego, less often discussed, namely its customary preoccupation with the future. Israeli, it will be remembered, reports that among his subjects over ninety per cent expressed themselves more interested in their futures than in their pasts (24) This finding is worth stressing, for as a rule, psychologists are more interested in a person's past than in his future. In other words, the psychologist and his subject customarily face in different directions, and that is unfortunate.

V. Psychology During the War and After

You and I are ego-involved in the course of the war and in the outcome of the future peace. Likewise, for different reasons, we are involved in the development and progress of psychology as a science and as a profession Now it is typical of the generalizing tendency in the ego that matters having a high degree of personal relevance do not ordinarily remain apart They tend to become fused into an integrated plan of action Thus, in order to help win the war approximately a thousand psychologists have transferred their pro-

fessional activity to camps, factories, or government offices. And most of those who have remained in colleges have rearranged their lives in such a way as to blend their war interests with their professional activity.

Although it is too early to evaluate the work we all are doing, I wonder if you have the same impression I have concerning the utility of our previous training in psychology. It is my guess that insofar as our war work deals with sensory, perceptual, and psychometric problems, the transfer value of our previous psychological training is very high. But insofar as our war work deals with problems of morale, public opinion, national character, scapegoating, ideology, guidance, rehabilitation— any of the areas where the major hates, fears, and hopes of men are concerned— the transfer value of our previous training is much less In other words, the psychology that treats the non-ego involved functions of the human organism has developed to a point of immediate utility, whereas the psychology of the 'central' regions of personality has not. I make this statement with full appreciation of the admirable work of our colleagues in OSS, in OWI, FBIS, and in other similar bureaus. But most of them, I think, would agree that the psychology available for application to their problems has shown itself to be both meagre and inept

It might be argued that, being a young science, psychology has moved, as it were, from the surface inward. Given time we shall have as much to contribute to an understanding of the central layers as of the surface But is it merely a matter of time? Is it not rather that the sumptuary regulations of our science have been unhealthy for the ego?

Everywhere we encounter the paradox. As a group, psychologists are liberal, internationally minded, and devoted to the welfare of the common man. They believe in providing a soil where the infinite varieties of the human ego may freely grow. At the same time their assumptions, their methods, their theories have not been well suited to the attainment of their objectives.

For the past ten years we have become increasingly aware of this paradox. As evidence, there is the mounting tide of

experiments of the type I have reviewed. As further evidence, there is the widespread recasting of our activities in wartime and the notable turning of psychologists' interests to the formulation of conditions for a lasting peace (51). In all this work there is a somewhat novel co-operative spirit. The coming Inter-Society Constitutional Convention is one instance of what I have in mind. As never before we seem to desire to have our productions fit together. Ego-satisfactions, we are discovering, are not necessarily competitive. One is reminded here of the experiments of Helen Lewis (unpublished) which have demonstrated that *your* tensions may be resolved by *my* work and *my* tensions may be resolved by *your* work, provided only that we regard ourselves as co-operating members in a common undertaking.

The admittance of the ego to good standing in psychology does not mean a re-importation of the *deus ex machina* of pre-Wundtian psychology. It does mean, however, a recognition of the fact that our predecessors who regarded psychology as the science of the soul, were not wrong in setting the problems of unity and personal relevance before us. What they called the soul, we may now, with good conscience, call the ego. In so doing, no clocks need to be set backward. Dialectics has already given way to experiment and to the clinic, and to still newer methods for studying the common man in his normal social setting.

But disregarding the problems of method, which are beyond the scope of my paper, we may safely predict that ego-psychology in the twentieth century will flourish increasingly. For only with its aid can psychologists reconcile the human nature that they study and the human nature that they serve.

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THE PSYCHOLOGY OF PARTICIPATION[1]

Reprinted from *Psychological Review*, **53**, No. 3, May 1945, 117-132

John Dewey has shown that psychological theories are profoundly affected by the political and social climate prevailing in any given time and place. For example, an aristocracy produces no psychology of individual differences, for the individual is unimportant unless he happens to belong to the higher classes (11). Dualistic psychology, he points out, flourishes best when one group holds a monopoly of social power and wishes to do the thinking and planning while others remain the docile, unthinking, instruments of execution (12, p. 72). And apologists for the status quo, he adds, are the ones who most readily declare human nature to be unalterable.

"The ultimate refuge of the standpatter in every field, education, religion, politics, industrial and domestic life, has been the notion of an alleged fixed structure of mind" (13, p. 273). It was no accident that psychological hedonism flourished as a justification for Nineteenth Century laissez-faire, or that reflexology blended with dialectical materialism dominated Russian psychology after 1917. All of us watched with dismay the abrupt perversion of German psychological science after 1933 (34). With such evidence before us can we doubt that American psychology too bears its own peculiar stamp of political and social dependency?

It is not my purpose to examine the thesis that social and economic determinism has been decisive in the history of psychology, nor the countercontention that the facts about human nature must be true regardless of any politico-ethical frame that we may hold. Dewey boldly declares democracy and sound psychology to be forever coextensive; it is impossible to have one without the other. He would frankly banish all psychological postulates that are not democratically oriented (4, esp. pp. 281, 283, 290).

Alluring as this whole problem is, let us limit our consideration to one distinctive, culturally-conditioned feature of American psychology.

I. American Psychology Predominantly a Motor Psychology

It will take but a moment's reflection for us to agree that the genius of American psychology lies in its stress upon action—or in slightly dated terminology,

[1] The Chairman's address to the Society for the Psychological Study of Social Issues, delivered September 16, 1944, at Columbia University. Dr. G. R. Schmeidler has kindly assisted in the preparation of this paper.

Author's note.—Were it customary for the Chairman of the Society to dedicate his address, I should offer my remarks in honor of John Dewey. He more than any other scholar past or present has set forth as a psychological problem the common man's need to participate in his own destiny. Furthermore, as a torch bearer of democracy he has illuminated the regions where the problems of participation must inevitably find their solution.

upon the motor phase of the reflex arc. Of all schools of psychological thought that we might name only behaviorism, in both its muscle-twitch and operational versions, is primarily American. Functionalism is American (rather than German or British) chiefly in its motor emphasis. Capacity psychology and mental testing in America deal primarily with accomplishment, activity, performance. The individual differences that are said to be a typical American interest have to do chiefly with measurable operations. We seldom record, for example, an individual's unique and subjective pattern of thought-life.

Of the many potential lines of development laid down in James's *Principles* over 50 years ago, the threads that were picked up were the radical motor elements, leading in the hands of Holt, Washburn, and Langfeld to a *motor theory of consciousness*, in the hands of Dewey to a psychology of *conduct, adjustment,* and *habit*. James himself established *pragmatism*, a doctrine that invites attention almost exclusively to the motor consequences of mental life. When James waxed ethical, as he frequently did, his moral advice was generally, "If you really care about something, you should *do* something about it." Even Josiah Royce whose thought is often said to be the opposite of James's, agreed (like a good American) with his emphasis on *action*. Loyalty, said Royce, "is complete only in motor terms, never in merely sentimental terms. It is useless to call my feelings loyal unless my muscles somehow express this loyalty . . . Nobody can be effectively loyal unless he is highly trained on the motor side" (30, pp. 239, 241).

Returning on every ship from Europe (until ten years ago) were fresh young American *Doktoranden*. Their intellectual luggage was filled with European theories and concepts. But when unpacked at our motor-minded laboratories, these importations looked alien and were promptly subjected to a strenuous course in Americanization. *Feelings of innervation*, for example, were promptly dubbed outlandish. *Innervation* would do, but feelings were *de trop*. *Ideo-motor* theory arrived, and though given a hospitable welcome by James, made little headway. *Ideas*, as the sovereign source of movement, smacked too much of the divine rights of Herbart. When ideas were offered to American psychologists, they commonly replied, "Keep them; stimulus and response will do quite nicely, thank you." *Empathy* arrived in a portmanteau packed in Munich. It was embedded in a whole self-psychology and in an epistemology of *Wissen vom fremden Ichen*. Everything went into the ash can save only a greatly oversimplified version of what Lipps originally intended. *Motor mimicry* was all we wanted. What would we be doing with a "mental act that held a guarantee of the objectivity of our knowledge"?

Importations in the psychology of thought were so roughly handled that they scarcely survived at all. What was *unanschaulich* in Würzburg became *anschaulich* in Cornell. To think without images seemed mildly treasonable, but to think *with* them gradually became unpatriotic. Better to think with our larynx, hands and viscera, or better still in recent years with our action currents. To explain volition in Würzburg an impalpable decision factor, a *Bewusstheit*, was needed. But it all became so much simpler in Berkeley—a mere matter of rat-vibrissæ quivering with VTE at a choice point in a maze.

Other transformations were equally drastic. Of the countless dimensions for the study of personality proposed by Stern, the IQ alone was picked up. Wertheimer died perplexed by the selective attention Americans were paying

to the visible tangible portions of his work (21) The entire *Geisteswissenschaft* is known in this country chiefly through an absurd little pencil and paper test leading to the inevitable profile. Small wonder that Spranger exclaimed, "Die grosste Gefahr Deutschland s ist die Amerikanizierung" (*Cf* 32, p 109)

One might think that phenomenology, since it derives from *Akt* psychology, might take hold in this country But *mental* acts are not popular, it is *motor* acts that count Or one might suppose Americans would take to *Intentionality*, a concept dealing with the orientation of the subject toward an object from which one might predict his future action But such a concept is still too subjective It is hard for us to even understand what it means *Attitude* we will admit—if it can be operationally defined—but intentionality is just too Central European

In short, we as Americans have motorized psychology. Our theories of human nature transform meditative functions into active functions The process clearly reflects the demand of our culture that inner life issue quickly and visibly into tangible success that closures be reached both overtly and swiftly

Do I seem to deplore the one-sidedness of our approach? I do not mean to Quite the contrary, it is our way of going at things Our preference for action, for objectivity, has carried us to new levels of attainment, and will carry us still further In the future European models will be followed even less than formerly What we produce must be indigenous within our culture and must harmonize with our active orientation It is especially true in social psychology, I think, that our derivations from Europe are virtually at an end. What may have been valid in Wundt, Durkheim, Le Bon, Tarde, Pareto, will in the postwar era find better expression in the fresher, behavioral approach of America *It will do so, that is, if our psychology of social action expands to give fuller play to the activities of the total organism than has been customary in the past* Even though subjective categories do not appeal, we need to find better ways of linking our psychology of action to the central regions of personality Up to now little progress has been made in this direction

II Motor Activity and Higher Mental Processes

True, American psychologists have to their credit the discovery that motor activity plays a pivotal role in higher mental functions Take as an example, *learning* we have repeatedly insisted that learning is 'not passive absorption but an active response!' In the classic experiment by Gates, learning scores jumped 100 per cent when four-fifths of the subject's time was devoted to recitation rather than to passive reading (18). Haggard and Rose, recently reviewing many learning studies, including those that have to do with the simple conditioning of reflexes, report that in all cases learning seems to be facilitated if the subject himself overtly takes part, perhaps by turning the switch that rings the conditioning bell, or by drawing a line to accompany the apparent movement of the autokinetic phenomenon, or even by clenching the fist while memorizing nonsense syllables These authors generalize these studies under a *Law of Active Participation*, " when an individual assumes an active role in a learning situation (*a*) he tends to acquire the response-to-be-learned more rapidly, and (*b*) these response-patterns tend to be more stably formed, than when he remains passive ' (20, p 56)

How to permit such helpful motor activity to go on in a classroom where 50 pupils are busy learning, is a large-sized pedagogical problem. "The chief

source of the 'problem of discipline' in schools," says Dewey, "is that the teacher has often to spend a larger part of the time in suppressing the bodily activities" of the children (14, p 165) The situation is wholly abnormal in that the teacher tries to divorce bodily activity from the perception of meaning, and yet perception of meaning is incomplete without full manipulation and adequate bodily movement

Memory for material learned in school and college is notoriously poor, so poor that educators are forced to console themselves with the wistful adage which holds education to be "what you have left when you have forgotten all you learned in school" Perhaps a few studious attitudes, a few analytical habits are left, but should *content* disappear from the mind as rapidly as it does? We know that content acquired through personal manipulation does not seem to evaporate so rapidly.

I recently asked 250 college students to write down three vivid memories of their school work in the 8th grade Afterward I had them indicate whether the memories involved their own active participation in the events recorded Were they reciting, producing, talking, playing, arguing, or were they passively listening, watching, not overtly involved? Three-quarters of the memories were for situations in which the subject himself was actively participating, even though the percentage of time actually spent in participation in the average 8th grade room must be small

We may mention also the problem of *voluntary control.* Although America has contributed little enough to the psychology of volition, what it has contributed is typical—namely the finding of Bair (8) and others, that a large amount of excessive, and apparently futile, motor involvement is necessary before one can gain control voluntarily over a limited muscular segment of the body We know that a considerable overflow of effort is needed before fine skills can be differentiated and before the individual can develop any satisfactory degree of self-determination

In the realm of modern *therapy* self-propelled activity plays an increasing part, as the 'Rogers *technique*' becomes more and more widely applied (29) Analogously, the Kenny treatment for infantile paralysis requires the patient to take more and more responsibility and to be more and more active otherwise, it is discovered, the suggestions given by the therapeutist will not accomplish their purpose (10) Angyal refers to the universal experience of psychiatrists that healthy ideas can be easily conveyed to the patient on the intellectual level without the slightest benefit accruing The difficulty is to induce a state in which the idea "permeates the personality and influences the behavior" (7, p 326) In this war we have learned the importance of reconditioning at the front, that is, of allowing the patient himself quickly to work out his *own* relations with the terrifying environment that shocked him

Facing the problem of *reeducation* in Germany, Lewin points to the impossibility of ideological conversion until requisite experience is available "To understand what is being talked about," he says, "the individual has to have a basis in experience" No amount of verbal defining will convey the meaning of such concepts as 'his Majesty's loyal opposition' or 'fair play' To most Germans loyalty is identified with obedience, the only alternative to blind obedience is lawless individualism and laissez-faire (24)

One of the chief problems confronting the AMG to-day is to keep the inhabitants of liberated countries active in shaping their own destiny (5) Hand-outs beget apathy, and apathy prevents an interest in one's own future. How

much better it was for Parisians to retake their own city than for the Allies to have done all the work, handing over the finished product In his excellent new book *Mental hygiene*, Klein expresses the point: "Without action there is no shift from the wish to the deed There is motive, but no purpose There is yearning without striving, hence the potential self-improvement dies stillborn" (22, p 319) To be sure, we must not over-simplify the problem of rescue and emergency relief for Europe's dazed and demoralized citizens Yet the only rule to follow, so far as it is at all practicable, is to allow them to participate fully in their own rescue and rehabilitation

III Activity *Vesus* Participation

Facts of this sort prove to us that people have to be active in order to learn, in order to store up efficient memories, to build voluntary control, to be cured when they are ill, restored when they are faint

But implied in much American work is the proposition that one activity is as good as any other activity. It is *random* movement, according to much of our learning theory, that brings the organism to an eventual solution And according to one experimentalist, "If the body muscles are tense, the brain reacts much more quickly and intensely, if they are relaxed, it may react weakly or not at all" (9, p 23). The implication seems to be that tenseness of any kind makes for mental alertness Activity as such is approved

Random movement theories of learning, muscular tension theories of efficiency, speed theories of intelligence, and motor theories of consciousness do not make a distinction that seems to me vital, namely, the distinction between mere *activity* as such and true, personal *participation*

Before we examine this distinction as it affects psychological theory and practice, I should like to point out that the self-same distinction occurs in the economic and social life of the common man

Take, for example, Citizen Sam who moves and has his being in the great activity wheel of New York City Let us say that he spends his hours of unconsciousness somewhere in the badlands of the Bronx He wakens to grab the morning's milk left at the door by an agent of a vast Dairy and Distributing system whose corporate manœuvers, so vital to his health never consciously concern him After paying hasty respects to his landlady, he dashes into the transportation system whose mechanical and civic mysteries he does not comprehend At the factory he becomes a cog for the day in a set of systems far beyond his ken To him (as to everybody else) the company he works for is an abstraction, he plays an unwitting part in the 'creation of surpluses' (whatever they are), and though he doesn't know it his furious activity at his machine is regulated by the 'law of supply and demand,' and by 'the availability of raw materials' and by 'prevailing interest rates' Unknown to himself he is headed next week for the 'surplus labor market' A union official collects his dues, just why he doesn't know. At noontime that corporate monstrosity, Horn and Hardart, swallows him up, much as he swallows one of its automatic pies After more activity in the afternoon, he seeks out a standardized day-dream produced in Hollywood, to rest his tense, but *not* efficient mind At the end of his day he sinks into a tavern, and unknowingly victimized by the advertising cycle, orders in rapid succession Four Roses, Three Feathers, Golden Wedding and Seagram's which "men who plan beyond tomorrow" like to drink.

Sam has been active all day, immensely active, playing a part in dozens of impersonal cycles of behavior. He has brushed scores of 'corporate personalities,' but has entered into intimate relations with no single human being. The people he has met are idler-gears like himself meshed into systems of transmission, far too distracted to examine any one of the cycles in which they are engaged. Throughout the day Sam is on the go, implicated in this task and that—but does he, in a psychological sense, *participate* in what he is doing? Although constantly *task-involved*, is he ever really *ego-involved?*

Now this problem is familiar to all of us, and one of the most significant developments of the past decade is its entrance into both industrial and social psychology. The way the problem has been formulated by industrial psychologists is roughly this:

The individual's desire for personal status is apparently insatiable. Whether we say that he longs for *prestige*, for *self-respect*, *autonomy*, or *self-regard*, a dynamic factor of this order is apparently the strongest of his drives. Perhaps it is an elementary organismic principle as Angyal (7) and Goldstein (19) would have it, perhaps it is rather a distillation of more primitive biological drives with social competitiveness somehow added to the brew. For our purposes it does not matter.

What the industrial psychologist has discovered is that when the work-situation in which the individual finds himself realistically engages the status-seeking motive, when the individual is busily engaged in using his talents, understanding his work, and having pleasant social relations with foreman and fellow-worker, then he is, as the saying goes, 'identified' with his job. He likes his work; he is absorbed in it, he is productive. In short, in McGregor's terms he is industrially *active*, that is to say, he is participant (28).

When, on the other hand, the situation is such that the status-motive has no chance of gearing itself into the external cycles of events, when the individual goes through motions that he does not find meaningful, when he does not really participate, then come rebellion against authority, complaints, griping, gossip, rumor, scapegoating, disaffection of all sorts. The job-satisfaction is low. In McGregor's terms, under such circumstances the individual is not active, he is industrially *reactive*.

In the armed forces, in federal employment, in school systems, the same principle holds. Ordinarily those at the top find that they have sufficient comprehension, sufficient responsibility, and sufficient personal status. *They* are not the ones who gripe and gossip. It is the lower-downs who indulge in tendency-wit against the brass hats, who complain, who go AWOL, become inert, or gang up against a scapegoat. When in actual combat, all the energies and training, all the personal responsibility of which a soldier is capable, are called upon, then egos are engaged for all they are worth. Men are active, they have no time to be reactive, nor have they reason to be.

Accepting this analysis as correct, the problem before us is whether the immense amount of reactivity shown in business offices and factories, in federal bureaus, in schools, can be reduced, as it is when men at the front are using all their talents and are participating to the full in life-and-death combat.

We are learning some of the conditions in which reactivity does decline. Friendly, unaffected social relations are the most indispensable condition. Patronizing hand-outs and wage-incentive systems alone do not succeed. Opportunities for consultation on personal

problems are, somewhat surprisingly, found to be important And as members of this Society have shown, group decision open discussion, and the retraining of leaders in accordance with democratic standards yield remarkable results One of Lewin's discoveries in this connection is especially revealing People who dislike a certain food are resistant to pressure put upon them in the form of persuasion and request but when the individual himself as member of a group votes, after discussion, to alter his food-habits, his eagerness to reach this goal is independent of his personal like or dislike (25) In other words, a person ceases to be reactive and contrary in respect to a desirable course of conduct only when he himself has had a hand in declaring that course of conduct to be desirable

Such findings add up to the simple proposition that people must have a hand in saving themselves, they cannot and will not be saved from the outside

In insisting that participation depends upon ego involvement, it would be a mistake if we were to assume that we are dealing with a wholly self-centered and parasitic ego that demands unlimited status, and power for the individual himself (33) Often, indeed the ego is clamorous, jealous, possessive and cantankerous But this is true chiefly when it is forced to be *reactive* against constant threats and deprivations We all know of 'power-people' who cannot, as we say, 'submerge their egos' The trouble comes, I suspect, not because their egos are unsubmerged, but because they are still reactive toward some outer or inner features of the situation which are causing conflicts and insecurity Reactive egos tend to perceive their neighbors and associates as threats rather than as collaborators

But for the most part people who are participant in cooperative activity are just as much satisfied when a teammate solves a common problem as when they themselves solve it (26) Your tensions can be relieved by my work, and my tensions by your work, provided we are co-participants Whatever our egos were like originally, they are now for the most part socially regenerate Selfish gratifications give way to cooperative satisfaction when the ego-boundaries are enlarged

Nowadays we hear it said by our own colleagues that Americans will never participate in a postwar world union unless it is shown clearly to be to their self-interest to do so Undoubtedly the statement is true, but self-interest is highly extensible A revealing study by Lt Leighton conducted at a Japanese relocation center makes this point clear (23)

When the Japanese were asked to pick cotton in nearby ranches to help save the crop, very few responded The reason was that they were expected to donate all wages above $16 00 a month to a community trust fund, to be used for the common good

There was as yet insufficient community feeling, the over-all trust fund seemed too big, too distant, too uncertain All that happened was endless argument for and against the trust fund, while the cotton stood in the fields

At this point the schools asked to be allowed to go picking and to use the money for school improvements This request was granted, and soon church groups, recreational societies and other community units showed themselves eager to go on the same basis, and the project was a success

What we learn from this study is that self-interest may not extend to include an object so remote and impersonal as a community trust fund, but may readily embrace school improvements, church and recreational centers For most people there is plenty of ego-

relevance to be found in teamwork provided the composition of the team and its identity of interest are clearly understood

Americans will endorse international cooperation in the future (as they do at the present moment) provided they continue to see its relevance to their own extended egos, and provided they feel that in some way they themselves are participating in the decisions and activities entailed

Nearly everyone will bear testimony to the superiority of satisfaction that comes from successful teamwork as contrasted to solitary achievement Membership in a group that has successfully braved dangers and surmounted obstacles together is a membership that is ego-involved, and the egos in question are not parasitic but are socialized.

An important by-product of participation, as I am using the term, is the reduction of stereotypes Sam's mind we can be sure was a clutter of false stereotypes concerning the Dairy company, the transportation system, the abstract corporation for which he works, concerning economic laws, federal regulation, to say nothing of the tabloid conceptions begotten in Hollywood and by advertisers Had he really participated in his employment his notions of 'the Company,' of surpluses, of labor unions would have become realistic In recent years for some of us a job in Washington has happily shattered our previous stereotypes concerning sovereignty, bureaucracy, and other alleged attributes of 'the government' One of the favorable results of the war will be the fact that men who have shared a common destiny, participating together in bombing crews, in life-and-death assaults, will at last be freed from their tabloid assumptions regarding the nature of Jews, Negroes, Catholics, and other American minorities.

IV PARTICIPANT DEMOCRACY

At the time of a presidential election we know that only about three in every five eligible voters go to the polls At primary time the ratio is more likely to be one in every four Yet voting is the irreducible minimum of participation in political democracy People who do not vote at least once in four years are totally non-participant, those who vote only in a presidential election--these comprise at least a third of all voters--are scarcely better off And if we wished to complicate matters we might ask whether those who go to the polls are really participating with the deeper layers of personality, or whether their voting is, so to speak, a peripheral activity instigated perhaps by fanfare or by local bosses It would not be hard to prove that participation in political affairs, as well as in industrial, educational, and religious life, is rare In this respect most people resemble Citizen Sam

Two contemporary social psychologists have concerned themselves deeply with this problem They see that increasingly since the days of the industrial revolution individuals have found themselves in the grip of immense forces whose workings they have no power of comprehending, much less influencing One of the writers, John Dewey, states the problem in this way

"The ramification of the issues before the public is so wide and intricate, the technical matters involved are so specialized, the details are so many and so shifting, that the public cannot for any length of time identify and hold itself. It is not that there is no public, no large body of persons having a common interest in the consequences of social transactions There is too much public, a public too diffused and scattered and too intricate in composition" (15, p. 137).

Dewey has spent many years seeking remedies for this situation. Chiefly he has laid emphasis upon the need for face-to-face association, for evolving democratic methods within school and neighborhood so that citizens may obtain in their nerves and muscles the basic experience of relating their activities in matters of common concern. Some political writers, e.g., Mary P. Follett (16), have held that the solution lies in reconstituting political groups on a small enough scale so that each citizen may meet face-to-face with other members of a geographical or occupational group, electing representatives who will in turn deal face-to-face with other representatives. Though the town may no longer be the best unit for operation the spirit of the town-meeting is thus to a degree recaptured. "Democracy," says Dewey, "must begin at home and its home is the neighborly community" (15, p. 213).

Central to Dewey's solution also is freedom of publicity. To obstruct or restrict publicity is to limit and distort public opinion. The control of broadcasting and of the press by big advertisers is an initial source of distortion. Other groups need freer ventilation for their views, in order to reduce rigidity, hostility, and reactivity.

The second social psychologist, F. H. Allport, states the problem rather differently. He asks how an individual enmeshed within innumerable cycles of activity all imposed upon him from without can retain his integrity as a person? Like Sam, he finds himself a cog in countless corporate machines. State, county, federal governmental systems affect him, as do economic cycles, the impersonal systems known as private enterprise, conscription in wartime, social security; so too city transportation, milk production and delivery, consumption, housing, banking. But he does not affect them. How can he?

F. H. Allport points to an inherent contradiction that seems to lie in Dewey's position (1, Ch. 5). The latter hopes that the individual will participate in every public that his own interests create in common with others. That is to say, Sam should join with others who are affected by the same municipal, banking, transporting, feeding, housing cycles and work out common problems. But Sam would be a member of hundreds of segmental types of public. And in dashing from one 'common interest' meeting to another, he would not find his interests as an individual truly fulfilled by being partially included in multiple groups. He would still be a puppet of many systems. As complexities increase under modern conditions, total inclusion of the personality in specialized publics becomes increasingly difficult to achieve.

Like Dewey, F. H. Allport has given various suggestions for the solution of the problem but chiefly his emphasis has been upon the creation of a scientific spirit in the common man encouraging him to call into question the corporate fictions, the sanctity of the economic cycles, which, unthinkingly, he takes for granted. By questioning the transcendental reality commonly ascribed to nationhood, to 'consumer competition,' to institutional fictions, and by substituting direct experience with the materials affecting his life, the individual may himself eventually work out a measure of integrity and wholeness within himself (2).

Both Dewey and F. H. Allport seem to agree that the only alternative to a keener analysis of the behavioral environment and more active participation in reshaping it, is to give way progressively to outer authority, to uniformity, to discipline, and dependence upon the leader. This battlefield exists here and now within each of us. The answer to growing complexity in the

social sphere is renewed efforts at participation by each one of us, or else a progressive decline of inert and unquestioning masses, submitting to government by an élite which will have little regard for the ultimate interest of the common man

Now drawing together the threads of this problem, we are confronted with the following facts

1 Since the industrial revolution there has been increasing difficulty on the part of the ordinary citizen in comprehending and affecting the forces which control his destiny
2 Potentially the individual is a member of many, many publics, defined as groups of people having a common interest, for example, as voters, motorists, veterans, employers, consumers, co-religionists
3 No public includes all of an individual's interests

To these facts we add our earlier conclusions, namely, that

4 Activity alone is not participation Most of our fellow citizens spin as cogs in many systems without engaging their own egos even in those activities of most vital concern to them
5 When the ego is not effectively engaged the individual becomes reactive He lives a life of ugly protest, finding outlets in complaints, strikes, above all in scapegoating, in this condition he is ripe prey for a demagogue whose whole purpose is to focus and exploit the aggressive outbursts of non-participating egos

V Toward a Solution

It is risky indeed to suggest in a few words the solution of such an immense social problem Certainly it will require the combined efforts of educators, statesmen, and scientists to rescue the common man from his predicament

But from our preceding discussion one line of thought stands out as particularly helpful

Is it not true that all of us find coercive demands upon our motor systems imposed by the corporate cycles in which we move, generally *without* serious frustration resulting? Speaking for myself, only the outer layers of my personality are engaged in my capacity as automobile owner, insurance holder, Blue Cross member, consumer of clothing, patron of the IRT Perhaps, you say, I should be more interested in these cycles, but I reply one must choose and other things are more important to me In this age of specialization all of us are willing to delegate expert functions to experts We simply cannot be bothered about the innumerable technical aspects of living that are not our specialty To be sure, in matters of broad political or ethical policy-making the story is different, we cannot so easily avoid responsibility Political reforms making possible good schools, recreation, and health are presumably the concern of all people National policy in securing a lasting peace is a matter of great moment for each one of us But even among these broad social and political issues I find some that excite me more than others

What I am saying is that I cannot share Dewey's dismay at our failure to create innumerable self-conscious publics wherever there are common interests In the first place, these publics need operate only on the broadest policy-forming level, and, in the second place, a relatively *few* members of a group can often serve adequately as representatives of others who are like-minded I do not mean that a few public spirited citizens should do all the work There should be wider distribution of responsibility But my point is

that talents differ *What warms one ego chills another*

Now assuming that the major fields of activity open to all normal people are the economic, the educational, recreational, political, religious and domestic, we might assert that a healthy ego should find true participation in all of them Or allowing one blind spot to the bachelor, to the constitutional hater of sports or of politics, to the agnostic, there is still need for a balanced diet of participation in, say, five fields

Against some such norm we might test our present situation Do we find Citizen Sam truly participating in some *one* political undertaking, in some *one* of his economic contacts (preferably, of course, in his job where he spends most of his time); is he really involved in *some* religious, educational, recreational pursuits, and in family affairs? If we find that he is not actively involved in all of these areas of participation, we may, as I say, grant him a blind spot or two. *But unless he is in some areas ego-engaged and participant his life is crippled and his existence a blemish on democracy.*

In brief, it is neither possible nor desirable that all of our activities and contacts in our complex social order should penetrate beneath the surface of our personalities But unless we try deliberately and persistently to affect our destinies at certain points, especially where broad political policies are concerned, and in some of the other representative areas of our life, we are not democratic personalities, we have no balance or wholeness, and society undergoes proportionate stultification.

VI. New Directions for Social Psychology

Returning to our starting point, my contention is that the earlier emphasis of American psychology on motor activity as such is now changing into an emphasis upon ego-involved participation. As time goes on it will mark increasingly the essential differences that exist between movement initiated at the surface level and at the deeper levels of personality (3) To do so will not be to abandon our dependence on the social climate in which we work Quite the contrary at last the genius of American psychology will be brought into line with the century of the common man (17).

What concretely are the roles that psychologists will play in this process? At least half a dozen can already be fairly well defined:

1 To those who serve in some consulting or guidance capacity Citizen Sam will come as a client He will have this symptom or that—perhaps resentment, depression, bewilderment, or apathy. Among college students, a certain unpublished study suggests that 20 per cent are apathetic, complaining that they have no values whatever to live by It calls for great therapeutic skill to lead such clients to commit themselves unreservedly to something I have suggested that a balanced personality needs deep-rooted participation in all or most of the six spheres of value, the political, economic, recreational, religious, cultural-scientific, and domestic But commitments cannot be too comprehensive It is not politics or economics as a whole that evokes participation, but merely some one limited and well-defined issue in the total sphere The democratic personality needs to influence *some* but not all of the factors that influence him in representative fields of his activity

2 The consultant may go one step further Sam should feel not only that he is a citizen participating at crucial points in common activities, but he should be oriented as well toward the inner crises that will occur, for example, in middle age when vitality recedes,

when his furious activity can no longer be sustained, when he faces old age and death itself Sam, if I may put it in this way, needs to find that metaphors and images are more important ultimately than motor gyrations In other words, the consulting psychologist has responsibility for encouraging subjective richness in personality For in the broader sense participation extends beyond the days when active citizenship is possible The ego needs to be wholesomely attached to life even after efficiency of action declines

3 Industrial psychologists and group workers have already found a rewarding line of work in educating management, foremen, and employees in respect to the conditions that increase efficiency through participation in the job The same type of effort is also yielding returns in other directions—especially in recreational and educational enterprises

4. I would call attention specifically to the forum movement in this country which is one of the symptoms of the common man's awakening Problems of group discussion lie at the very core of social psychology, and we shall do well to seize the opportunity now offered for investigation and social action in this field I suggest that public opinion polls be geared to these neighborhood discussion meetings Opinion recorded cold on a front porch is likely to be different and less enlightened than that recorded after an hour's participation in a people's policy forum

5 As teachers, both in college and in adult centers, we have a job to do in encouraging the participation of the public in the progress of science itself The layman now finds it impossible to keep pace with science Dazed by the benefits of radio, auto, airplane and vitamins, all of which regulate his life, he stands on the sidelines and cheers as the procession of science goes by He has little real contact with the material from which his life is fashioned and little understanding Exhibitions, demonstrations and simplified experiments will help him understand (2) But the layman needs even more, he needs to know how to control the applications of science While bestowing upon him many blessings, science has also given its bounty to tyrants and to the self-appointed elite, with the result of fabulous fortunes for the few, slums and squalor for the many, violent wars and suffering beyond endurance The common man has not chosen these consequences He was never consulted, was never participant in guiding the applications of science

It would not be difficult to expand this list of services that psychology can provide in leading the common man into more effective participation during the democratic renaissance that lies ahead The fact that so many of us have had active war experience guarantees that devices and techniques, as well as the requisite purpose, are available for this work

Before listing my sixth and last suggestion, may I digress for a moment to call attention to the present training that psychologists are obtaining as participants?

VII Psychologists as Participants

The Office of Psychological Personnel tells us that within the current year, approximately one-quarter of the 4500 psychologists listed are in the armed forces (64 per cent if we count only male psychologists between 18 and 38); another quarter works full or part time for the federal government or war agencies (27) Impressive as these figures are they do not include many others who are closely linked to the common effort through unreported community work and personal sacrifice On the other hand, to be sure, some nominally

engaged in war work may be mere idler-gears accomplishing little Though they spin in the total chain their egos are not engaged For the most part, however, the involvement is authentic and the experience gratifying

One wonders what the youthful portion of the profession will do with their training Some have lost their taste for academic life and will remain in 'practical' work Among those who return to teach we can anticipate that the content and form of their instruction will be affected by their experiences One of our ablest young social psychologists writes me that he intends, if it can be arranged, to teach six months in the year and spend the other six in an advertising business where social psychology is put into practice In doing so he is not forsaking science, quite the contrary, he knows that only by observing the *installation* of psychological science can its facts be separated from its fantasies

What the war has done for the majority of social psychologists is to provide them with a direction for future work, a direction that will not be lost in our generation. Committed to advancing democracy, we have found tools to work with, specialties that we mean to continue to use There are polling, content analysis, group decision, leadership training, devices for alleviating minority tensions, and many other useful techniques

There are also negative lessons we have learned One of these has impressed me constantly since the excited summer of 1940 I dare say we have all had the experience of seeing plans manufactured too rapidly Most of the blue-prints we drew up have become waste paper Quick and alert minds meet in a committee, good rapport is established; solutions are rapidly designed at the verbal level They are plausible solutions, and often seem much better than the policies and practices that eventuate under the auspices of less expert groups An example of what I mean is the 500 page blue-print prepared by the Committee for National Morale early in 1941 for a Federal Morale Service It seemed like a more adequate plan than the stammering series of arrangements that followed, the OFF, COI, OSS, OWI But obviously the blue-print was not geared to political realities How many other plans fail because they are not suitable to the existing situation?

Granted that plans of men, like those of mice, 'gang aft agley,' should the plans of social scientists suffer as large a proportion of casualties as they do? There are plans for community work, plans for international cooperation, plans for reorganization of a faculty, for postwar rehabilitation, for this and for that My impression is that the plans devised by social psychologists are unusually fluent, plausible, and reflect a high 'verbal factor' But for the most part these good intentions fail in action Our thoughts leap heavenward, our muscles remain below Conceding that intellectual leaders should often point to goals above present probabilities of attainment, that they should be didactic, imaginative, still the mortality rate of their plans in these times of crisis is too high

There are many occasions when an academic social psychologist evolves a bright idea, does the exploratory work, obtains rather convincing results on a limited scale, and then finds himself blocked in getting his ideas used His participation is excellent up to a point, but it falls short of application—which means it falls very short indeed The final chapter to the sad story is sometimes that his ego ceases to be active, and becomes reactive He feels frustrated, becomes critical, bites at the brass hats, the Foundations, and lapses into apathy.

The roots of his difficulty are probably three in number (1) Though he has sensed a need, no responsible organization has signified its intention to use his results He has proceeded without adequate cooperation and guidance (2) He has not learned to write simple convincing, action-compelling reports of his research (3) He is too much of a solipsist, unable to realize that because results are fascinating and significant to him, they will not appeal to men who make policies and initiate action unless these men too are worried about the problem in question, and unless the results reach them at the right *time* and in a clear *way*

A social psychologist must not expect people to applaud his neat study because it is a neat study Public policy will never mesh itself into the tempo of the laboratory or into the style of our technical journals To be effective social psychology must go 100 per cent of the way in meeting the demands of policy-forming agencies in respect to the content, the style, and the timing of its work It is sad to note that our profession, by and large, is not adept at the task of installation, whether in government bureaus, industry, or the community

There are, of course, striking individual exceptions In these fortunate cases the psychologist becomes effective because of his ability to combine in his own person the functions of both 'fact finder' and 'operator' (6, 31)

VIII Conclusion

My final point is a plea that in future theoretical and systematic writing social psychologists give due consideration to the historical trend I have outlined Reduced to the briefest possible statement it is this:

Half a century ago psychologists characteristically ascribed to the personality certain governing agencies the will, the soul, the self, the moral sentiments, or some other ruling faculty Subsequent emphasis upon the motor processes, especially in America, resulted in a kind of entropy for personality Being deprived of its self-policing functions personality seemed to dissolve into endless cycles of motor activity controlled by stimulus or by habit Like a taxicab its successive excursions had little relation to one another Then gradually some principles of self-regulation returned to psychology, a bit timidly and not too clearly, under the guise of 'integration,' 'vigilance,' 'homeostasis'

'Ego-functions' too were introduced to provide for a re-centering of personality with an increase in its stability Ego-functions, as I have shown elsewhere, are of many kinds, and the ego is susceptible of many definitions (3)

Perhaps the most important distinction concerns reactive ego-functions which are resistant, contrary, clamorous, as opposed to active ego-functions which find full expression in participant activity When participating the individual discovers that his occupational manipulations grow meaningful, his community contacts are understood and appreciated He becomes interested in shaping many of the events that control his life.

Participation, as opposed to peripheral motor activity, sinks a shaft into the inner-subjective regions of the personality It taps central values Thus in studying participation the psychologist has an approach to the complete person

Random movement, derived from the sensori-motor layer of the personality, has too long been our paradigm for the behavior of man It fails to draw the essential distinction between aimless activity and participation The concept of random movement denies dignity to

human nature, the concept of participation confers dignity. As American psychology increasingly studies the conditions of participation it will elevate its conception of human nature, an event, we can be sure, that will at last gratify the man in the street

In focusing upon problems of participation social psychology will also be advancing democracy, for, as Dewey has shown, the task of obtaining from the common man participation in matters affecting his own destiny is the central problem of democracy

Skills learned by at least half our profession during this war are well-designed to carry out this purpose Psychologists can employ them in diverse ways as consultants, group workers, personnel executives, teachers, writers, and community leaders. And in following this road psychologists as individuals will find their own salvation, for—common men that they are—they will discover that they too are participating in the march of democracy

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GENETICISM *vs* EGO STRUCTURE IN THEORIES OF PERSONALITY

Reprinted from British Journal of Educational Psychology XVI, June 1946, 57-68

I.—Introduction

Until very recent years modern theories of personality have suffered from an overemphasis upon genetic determinants of conduct. Instincts, early habits, and the autochthonous Id between them have fashioned an account of motivation that is essentially archaic. The resulting theories fail to deal adequately with the *contemporary* character of human motives, neglecting especially the variety, individuality, and intentionality that are the earmarks of adult purposes.

Because I believe these statements to be true I have accepted the editor's kind invitation to participate in the present symposium, and likewise his suggestion that I might care to dip back into the preceding symposium of this Journal which dealt with the portentous question, 'Is the Doctrine of Instincts Dead?' As I see it the same fundamental issues underlie both series of papers.

In the earlier symposium various authors dealt generously with my own views on motivation.[1] In all cases I find their expositions lucid and fair, and their criticisms trenchant and helpful. Mr. Burt, the strongest champion of instincts and the least persuaded by recent attacks upon the doctrine, is understandably a sharp, but eminently just, critic of the theory of 'functional autonomy.' Before discussing Mr. Burt's arguments may we take a brief glance backward in order to see just where, in 1946, theories of personality seem to stand?

II. Perspective

Prior to the last two decades nearly all of the important influences upon modern psychological theory stressed the importance of constitutional, instinctive, or early developmental factors. The 'New Psychology' began in the late Nineteenth Century with lingering traces of phrenology, and sought in brain localisation to discover some unchanging determinants of behaviour in constitutional make-up. But it drew its main strength from Darwin's demonstration of the continuity of species. To Morgan, Loeb, McDougall, James, Thorndike and many others it was self-evident that the instincts of animals continued in the human species to be the prime movers. When the day of behaviourism dawned, reflexes and drives replaced instincts, without (as many critics have correctly argued) changing the essential emphasis upon innate motivation.

[1] P. E. Vernon, this *Journal*, 1942, Vol. 12, 1-9; T. H. Pear, this *Journal*, 1942, Vol. 12, 139-147; C. Burt, this *Journal*, 1943, Vol. 13, 1-15. Mr. Pear has also presented a digest of my views in his paper 'Are there Human Instincts?' *Bulletin of the John Rylands Library*, 1942, Vol. 27, No. 1.

Then came the conditioned reflex In essence this doctrine is as nativistic as is McDougall's conception of instincts Both views allow for an extension of stimuli that will arouse an original unconditioned dynamism A behaviourist who holds that high morale or firm ideological conviction in an adult represents a conditioning of security responses that originated, perhaps, in prolonged breast-feeding, is arguing that the hunger-drive and sucking reflexes underlie to-day's mature conduct The argument is like McDougall's The latter would say that high morale reflects a well-developed sentiment of self-regard, which in turn is sustained by a blend of instinctive energies, chiefly self-assertion and submission For my part, I find it far easier to understand McDougall's conception of the channelling of instinctive energies at the successive stages of development than to imagine what dynamism is supposed to underlie contemporary motivation in terms of conditioned drives The behaviourist traces the fear of furry objects to the infant's startle at the barking of a dog But such conditioning, we know, lasts only a short time unless reinforced Why do we find so much timidity and anxiety in adults without reinforcement through the unconditioned startle mechanism? Forced to choose I should certainly elect McDougall's explanation in terms of a channelled and fixated instinct of fear

The essential triviality of conditioning as a formula to account for persistent motives (other than prepotent reflexes or viscerogenic drives) led many early behaviourists into Freudianism Like McDougall, Freud had a reservoir of energy to draw upon (Horme, Libido), though Freud's instincts were less differentiated and less numerous than McDougall's Everyone knows that Freud ascribed motivation to the Id, and said ' the structure of the Id never changes ' By insistence upon the unchanging character of the Id, Freud presented us with another archaic conception of motivation that is at once fatalistic, blind, and inescapably infantile

By stressing, in addition, early repressions and fixations—which give the slant to the individual style of life—Freud brought on another phase of geneticism in modern psychology Think of the vast literature accumulated in recent years to warn us that infant security, infant overdependence, sibling jealousy, and toilet training give a set to personality that can scarcely be abrogated by later experience Psychoanalysts (both Freudian and others) behaviourists, and child psychologists of all sorts, seem agreed on the importance of early habit-formations They view habits not only as ' second nature ' but even, according to one enthusiast, as ' the whole of human nature '

The instinct doctrine of the McDougallian variety, as I have said, is more acceptable than the crude theories of ' concatenated reflexes ' which when appropriately conditioned are suppossed to account for all behaviour The latter theory is totally unable to provide any intelligible conception of the *present* causation of behaviour Conditioning, as I have said, requires reinforcement (to prevent extinction), and what native sources of energy, pray tell, are called upon to reinforce the motives of patriotism, the sense of duty, or a passion for book-collecting? McDougall can at least call upon the lasting energies of the parental instinct, self-assertion, and submission to account for such complex and evolved interests Yet the remoteness of these postulated McDougallian energies from the concrete structure of contemporary motives is a troublesome matter. It is not with McDougall's concept of purpose that one can quarrel, but only with the pre-ordained, eternal, and abstractly conceived character of the purposes proposed by him

After the decline of phrenology, the geneticism of constitutional endowment had less influence than the geneticism of instincts, conditioning, and early

fixation Yet in recent years one marks the resurgence of constitutionalism in the work of Kretschmer and still more recently, of Sheldon [1] The mild merits of this approach may be appreciated even if we are forced to reject its excessive claims

To summarise Psychoanalysis, behaviourism, hormic psychology, constitutional psychology, and the preoccupations of child psychologists, all favour a backward emphasis They regard motives, say at the age of fifty, as elaborated, conditioned, sublimated, or otherwise modified, editions of instincts, drives or of an Id whose structure ' never changes ' One might as well say that the pianistic dexterity of Myra Hess is an elaboration and extension of her original grasp-reflex Granted that there is a continuous evolution of her manual dexterity from the days when the grasp reflex was her only digital stock in trade, is the energy that sustains her skill the aboriginal energy of the grasp? The grasp reflex served one function in her life, musical dexterity a wholly different function *Historical continuity does not mean functional continuity.*

Although geneticism in one form or another has clearly dominated most modern theories of personality, it has not held exclusive sway There is, for instance, the mathematical approach This, surely, takes a cross-sectional view, attempting to determine the principal patterns (traits, factors, syndromes) that colour a life at the moment the anaylsis is made. Geneticism is not over-emphasised by the mathematical psychologists But would it not be fair to say that factorists in general show very little interest in the theoretical problem of motivation? Factorial work is infrequently applied to orectic qualities, and where it is applied the nature of the resulting units is unclear. Though contemporaneous in its emphasis, the conception of factors, like that of instincts, seems to me remote from the specifically goal-directed behaviour of a concretely motivated individual

Somewhere in the past twenty-five years a new orientation began to appear The past began to lose its appeal to certain theorists, and the present and the future correspondingly to gain Gestalt psychology illustrates the trend To advocate ' insight ' and ' belongingness ' is to advocate current, and even momentary, dynamisms The discovery of the motivational character of persistence in interrupted tasks, and of other closure-activities, led to an emphasis upon the immediate situation The Field-theory of Lewin, with its topological representation, makes it almost impossible to include genetic factors in the representation of field forces Again, a rebirth of introspective studies brought in the ' feel ' of motives as parts of the self Koffka began to speak of the ' ego ' as a region of the personality having to do with states of tension and self reference which are so characteristic of motivated behaviour.[2] There is virtually nothing in the writings of Kohler, Koffka, Lewin, and others of the Gestalt persuasion that would suggest that what we do to-day is a necessary product of unchanging Id, eternal instincts, or early conditioning Belongingness, the field the ego, closure, are the characteristic motivational concepts

Furthermore, a shift has definitely occurred in psychoanalysis Currently, psychoanalysts are inclined to ascribe much more *momentum* to the ego than did Freud Elsewhere I have commented on this development [3] I will only illustrate it here by a quotation from Heinz Hartmann, who writes

[1] W. H. SHELDON *The Varieties of Human Physique*, 1940, and *The Varieties of Human Temperament* 1942 (New York and London Harper and Bros)

[2] K. KOFFKA, *Principles of Gestalt Psychology*, 1935

[3] 'The Ego in Contemporary Psychology,' *Psychological Review*, 1943, Vol 50 451 478.

adaptation to reality—which includes mastery of it proceeds to a large extent from the ego and in particular from that part of the ego which is free from conflict, and it is directed by the organised structure of ego functions (such as intelligence, perception, etc) which exist in their own right and have an independent effect upon the solution of conflicts [1]

Outside psychoanalytic circles the powerful therapeutic movement, called 'non-directive therapy,' is gaining ground with a distinctly anti-genetic platform The patient is allowed to re-structure and re-plan his life, with as little or as much reference to past motives and influences as he himself feels to be relevant. It turns out that he, unlike the geneticist, is normally interested more in the future than in the past Indeed, if we pause to think about it, any personal problem has an *effective* relation only to one's future, since it is in the future that all problems must be solved The ego in taking command projects itself forward into the future, and recasts its motives largely in terms of intentions and plans

III.—Ego-structure.

Few writers on war-neuroses or morale have been able to avoid using the concept of the ego Writings dealing with theory, like those dealing with therapy, have re-introduced the very term which long ago fell into disuse Its period of desuetude, incidentally, coincided fairly with the supremacy of geneticism in psychology

Over and over in the past five years we have read of the 'firm ego-structure' and the 'weak ego-structure' The former, it is often said, resists fear whether immediate or repressed, the latter succumbs to the traumatic conditions of battle [2] Prisoners best able to resist the tortures of a concentration camp are those who have firm purposes and strong political convictions [3]

One may ask, 'Did not Freud acknowledge ego-strength in the ability of a patient to hold his impulses in check and to steer a safe course between, the tyrannies of the Id, the Superego, and the harsh environment?' He did, but he also claimed that the ego has no energy of its own; it is passive It is the mere rider on the horse

War studies show indisputably, I think, that far from being a passive agent, the ego is a dynamic process of great positive power What but a motivational structure of immense momentum *could* handle the fatigue, fear, anger, apathies, disgust and conflicts aroused by war-time conditions? Morale ascribed to ego-strength is not passive, it is a matter of powerful, dominant interests, capable of promoting activity so vital that lesser, segmental, impulsive activities are inhibited effectively and without serious repression.

A few passages from one of the recent books on psychiatric combat casualties indicate that the primary purpose of treatment is to restore normal ego-strength (i e, normal and current interests and motives) in order to offset the ravages of segmental and impulsive fears and conflicts I quote from Grinker and Spiegel [4]

> As the ego becomes stronger, the therapist demands increasing independence and activity from the patient (p. 94)

A soldier (or civilian) is abnormal if he cannot proceed according to the

[1] 'Ich-psychologie und Anpassungsproblem,' *Intern J Psychoanal*, 1940, Vol. 21, 214-216

[2] J Dollard, *Fear in Battle*, 1943 (New Haven: Institute of Human Relations)

[3] B. Bettelheim, 'Individual and Mass Behaviour in Extreme Situations,' *Journal of Abnormal and Social Psychology*, 1943, Vol 38, 417-452

[4] R R Grinker and J P Spiegel, *War Neuroses*, 1945

habits of his ordinary, daily motivation. Horribly shocked, he becomes fearful, uncontrollably hostile or apathetic. In any case he finds that he cannot absorb and handle the traumatic conditions. The provocation is great:

> It is difficult to describe the intensity of these hostile feelings before which the ego recoils and withdraws (p. 96).

Yet, normally, even these incredibly severe strains are handled adequately by an ego which is so firmly attached to its present projects that it refuses to regress or to split. And even when the break comes the physician knows there is a *norm* for each person to which he must be helped to return. After treatment the physician writes with gratification:

> The ego now seemed in full control (p. 105).

It is an interesting discovery that unless the ego resumes control soon, there is special danger of malignant repression, chronicity and rigidity. In terms of theory, this finding seems to mean that the ordinary pattern of interests that comprise morale normally balances the life, but if denied dominance for too long a time, may yield permanently to regressive mechanisms. Hence it was up to the war psychiatrist, in the words of Grinker and Spiegel, to 'put pressure on the ego' to make it assume control as soon as possible (p. 113).

Now, is this ego structure—emphasised so much during war-time—a mere matter of instincts or early training or constitutional make-up? That it may be historically conditioned by these factors no one can deny. We have no data to show, for example, whether an optimum degree of security in early life correlates with ego-strength. We do know that war-time writers have emphasised rather the rôle of *group-identification* and of *ideological conviction*. Both make for resistance to combat neurosis. Both reflect the high importance of *contemporary* loyalty. The man who wants *now* to stand with his outfit, to support his commander, to win a victory for democracy, is the man who stands the strain. Even if it turns out that this man was also characteristically breast fed, secure within the family, father-identified, or (in physique) mesomorphic, the psychiatrist finds that ordinarily he cannot appeal to, or employ these factors. He invokes only the most recent, adult, motivational structure. Childhood security may or may not be a factor in resistance to breakdowns (I suspect the correlation is low), but ideological strength and loyalty are factors of proven importance. Grinker and Spiegel write:

> If the soldier could feel that the pain, the sacrifices, and death were dedicated to a larger purpose with which he was identified, his capacity to ward off anxiety would thereby increase (p. 119).

To summarise this section, I have argued that recent evidence and recent trends in theorising have drawn attention away from the 'remote control' of instincts, early conditioning, and habit formation, and have pointed to the decisive rôle that the present ego structure plays in directing human conduct.

IV.—FUNCTIONAL AUTONOMY

'Functional autonomy' is merely a shorthand phrase designed to call attention to some of the considerations I have just reviewed. It marks a shift of emphasis in the theory of motivation from geneticism in its various forms to the present ego of interests that contemporaneously initiate and sustain behaviour.

It is not necessary for me to repeat the lines of evidence I have adduced.[1] They include such diverse considerations as the high correlation between skills

[1] Especially in *Personality: A Psychological Interpretation*, 1937, Chapter 7. See also 'Motivation in Personality: Reply to Mr. Bertocci,' *Psychological Review*, 1940, Vol. 47, 533-554. 'The Psychology of Participation,' *Psychological Review*, 1945, Vol. 53, 117-132.

and interests, 'conative perseveration,' which refers to the haunting urgency with which tasks accepted by the individual are held in mind until completed; the obvious dynamism of sentiments which are so individual in character that they bear no ascertainable resemblance to underlying instincts. Patriotism, stamp collecting, religion, *are themselves* the needs of the person—often his *ultimate* needs.

In my earlier exposition, however, there was one defect which I have tried subsequently to remedy.[1] My picture of derived motives led some readers to accuse me of allowing for a complete anarchy among motives. A motive (I seemed to be saying) might evolve, severing itself from its root-forms, and lead a wholly independent existence, devoid not only of historical ties, but of relationship to anything else in the personality. Such a loose conception is, of course, untenable. Though motives may often be (and, I argue usually are) independent of their origins, they are obviously not independent of the contemporary ego-structure in which they are now embedded.

Let us take an example. During the war a fairly large number of illiterates turned up in the American draft. The men, negro and white, were sent to special training centres where, with the aid of ingenious methods of instruction, most of them acquired within eight weeks a degree of literacy equal to that of four years of schooling.[2] They were highly motivated to learn, the chief incentives being (1) to correspond by post with the folks at home; (2) to avoid the shame of using an X in place of a signature when others were watching, e.g., in signing the payroll; (3) to do what was expected of them. When these men left the special training unit, and especially after they were discharged from the army and returned home, these three incentives were completely eliminated. Yet many of the men, perhaps most, had acquired an interest in reading. The interest was a product of the three motives, but since all three became demonstrably inactive, its subsequent existence must have been autonomous of these origins. The interest in reading, we conclude, brought them *new* sources of satisfaction. It played a revised rôle in the economy of their lives. Not merely is the ego-structure somehow served by this new skill and interest, but the skill and interest are now a current *part* of the ego-structure itself. Literate interests now help to *constitute* the personality.

To say that some instinct must be sustaining the new literate interests is to invoke a remote abstraction. Even McDougall, I suspect, would grant that the interest in this case is merely an aspect of the generalized sentiment of self-regard. If so, his statement of the matter would be close to my assertion that the new interest now finds itself part of the essential economy of the ego. With the sentiment of self-regard the doctrine of functional autonomy has much in common. The chief difference is that the latter sees no necessity for invoking the energies of underlying, hypothetical instincts. An ego-structure (sentiment of self-regard) is quite sufficient to keep an individual on the move. It seems to me unnecessary to seek its dynamics, as McDougall does, in the twin and abstract propensities of self-assertion and submission.[3]

V.—Mr. BURT'S CRITICISMS.

Mr. Burt no doubt is still unpersuaded. I hope, however, that he may find my relating of functional autonomy to ego-structure somewhat more to his liking than the earlier version of the theory that he has criticised.

[1] *Psychological Review*, 1940, Vol. 47, 533-554.
[2] P. WITTY, 'New Evidence on the Learning Ability of the Negro,' *Journal of Abnormal and Social Psychology*, 1945, Vol. 40, 401-404.
[3] W. McDOUGALL, *Outline of Psychology*, 1923, p. 428.

His objections are all closely reasoned and well taken I shall list them

(1) Mr Burt starts with the evolutionary argument

> When the ape evolved into man, what freak of innumerable mutations abruptly obliterated all traces of the instinctive mechanisms, handed down throughout the ages through all our mammalian ancestors? Surely the 'higher brain centres' have been merely 'superposed' upon the lower, not suddenly inserted into their place [1]

Phylogenetic continuity, I grant, may not be denied The appetites of men and animals are much alike and rest on identifiable mechanisms that are closely similar Yet these drives and these mechanisms comprise only a fraction of the vast motivational structure of human beings Do we not know that the 'superposed' higher brain centres in many ways regulate and dominate the lower? Since this is so we have a right to expect a shift in emphasis and dominance of mechanisms as well as phylogenetic continuity

(2) He argues that drives are after all, instincts and, when admitted, surrender the argument to the instinctivist A serious misunderstanding exists Drives are primarily viscerogenic states of excess or deficit stimulation—what Woodworth calls conditions of 'tissue change' Besides the obvious pressures that arise in body cavities, blood stream and autonomic organs, we may include among drives, the irritation of proprioceptors and sensitivity (with a customarily adient response) to external stimulation This equipment and the attendant initial responses, let us concede, are innate, unlearned, universal They account for the 'absolutely dependable motives' which Klineberg finds to be the possession of every individual in every culture. What is more, their physiological foundations are clearly identifiable [2]

If instincts are defined in this way, then, of course, instincts exist But the doctrine of instinct generally smacks more of the 'pull' and less of the 'push' It stresses the innateness of the *purpose*, and most lists of instincts exceed by far the range of physiologically-grounded drives or 'absolutely dependable motives' that can be universally established

Though drives are instinctive, they don't carry us far with our theory of motivation They account well enough for the maintenance of physiological equilibrium and for initial and vague contacts with the environment They furnish a fairly adequate picture of *infant* motivation, but a poor picture of adult motivation Lust and the 'activity drive,' even hunger and elimination, are so regulated by acquired habits and sentiments that they do not for long operate as Simon-pure drives but soon take their place as dynamisms in the ego structure The drive-force becomes fused with, and modified by, psychogenic accretions Tastes often become inseparable from the drives

Mr Burt dislikes this view because he fears, to take the example of hunger, that we should

> have to abandon any notion that there might be a biological purpose in eating, because there must be as many purposes in eating as there are types of objects to eat (*op cit* p 5).

I see no real difficulty here We can take the purpose of eating at its face value, and acknowledge that hunger and other 'absolutely dependable' drives have a uniform significance for all creatures, without denying the obvious fact that differing tastes, modes and manners, do affect the operation of the drive, and form (from the individual's point of view) a highly integral part of the total motive.

[1] *This Journal* 1943 Vol 13, p 3

[2] O KLINEBERG *Social Psychology*, 1940 p 160 f

To admit drives in the sense here defined is not to open the door to such alleged instincts as acquisitiveness, gregariousness, appeal parental behaviour, submission, or self-assertion These concepts are not in the least comparable with drives, but are abstractions from learned human behaviour and ascribed without evidence to the primordial Horme

(3) My critic wonders, naturally enough, why some acquired patterns of activity and interest become autonomous and others not. Since he doubts that a satisfactory answer is forthcoming he suggests that any adult interest is, after all, secretly fed by the springs of some instinct or other He believes that the concept of ' instinctive reinforcement ' is more helpful to the teacher or therapist than the theory of ' functional autonomy, for in the former case one invokes deeper dynamisms and escapes the perils of rationalisation (*op cit* p 10)

In attempting to answer the question why some acquired motivational patterns become autonomous and others do not, I shall have to invoke the concept of ego-structure To take an example, one individual finds that the cause of labour, let us say, becomes his passion Everything connected with the rights of the working man takes on an urgency Another individual, with perhaps similar upbringing, remains cool and indifferent to the issue My first comment on this puzzling problem is that *all* theories of motivation fail to provide a full solution Instinctive reinforcement applied to the riddle is certainly vague Even assuming that in one case a bit of the parental instinct is involved and in the other case not, the question of *why* this selectivity exists between two individuals remains unanswered The conditioned reflex theory likewise finds no solution, at least so far as the *present* absorbing role of the interest in the personality is concerned Freud might invoke in the case of the labour enthusiast reaction-formation (say, a repressed hatred of the father), but he would have difficulty in either proving his point or changing the man's interest when this alleged ' reinforcement ' is uncovered

From the point of view of functional autonomy I would approach the problem by saying that this mature interest, like all others, is now a part of the individual's style of life , it *is* his present ego-structure It brings satisfactions, not to this or that instinct, but to his total blended sytem of current sentiments, aspirations and intentions It is not a channelling of the parental instinct, nor is it sublimated aggression (at least not necessarily) , it is *he* There are, of course, genetic reasons why he evolved this particular zeal, but now the ego-structure, in its present economy, consists of a blending of this powerful motive with many others which are not sharply separated from it Taken together they comprise the congruent pattern of the current ego-structure in which all dynamism resides

(4) Mr Burt worries lest by taking motives at their face value I open the door to all the misleading rationalisations of which every skilled psychologist is properly wary Yes, there may be such a danger We cannot always believe an individual's account of his own motives, for people have differing degree of insight into their own ego-structures What is more, in many cases there *are* infantile reasons for a current intense or obsessive interest Undoubtedly *some* labour-fanatics are merely expressing a neurosis But without careful diagnosis we cannot tell, and there is certainly no reason to assume that *every* current interest is merely a mask for hidden instincts or early repressions

I am inclined to believe that Mr Burt will agree with me on this point, for he too seems impatient with the archaisms of psychoanalysis, and with the everlasting recounting of stories of early life in place of establishing a current, cross-sectional analysis of motives (*op cit*, p 11)

Mr Burt, I believe, is on solid ground when he says that in individuals who have partly regressed or never risen above infantile level, one may look for the dominance of repressed innate tendencies Whatever these genetic tendencies are, it is chiefly in neurotic or infantile personalities that they hold sway (*op cit*, p 14) Normal people are not prisoners of the past

I would applaud Mr Burt's concluding statement in the symposium, 'Is the Doctrine of Instincts Dead?'

> In studying the more normal adult the assessment of acquired interests, motives, and ideals may be far more important, here indeed, lies a field of research which, as is generally conceded, has been sadly neglected hitherto (*op cit*, p. 14)

(5) Mr Burt wonders why habits-on-the-make should show so much functional autonomy, and why habits already formed recede in motivational force He would think that the opposite condition ought to prevail (*op cit*, p 11) My answer is that in learning a habit (driving a car, for example) the individual is distinctly *ego-involved* He has accepted the task, its accomplishment is important to his self-esteem While this condition lasts there is a peculiar urgency about acquiring the skill When once acquired it is relegated to the level of instrumentality and is called upon in the service of some more ego-involved motive

(6) Mr. Burt's sharpest shafts, like those of other critics, are reserved for my contention that an unavoidable corollary of the doctrine of functional autonomy is the resulting uniqueness of mature patterns of motives. Since this is a question of some moment I shall devote the following section to it

VI — The uniqueness of personality

In the preceding contribution to this Symposium, Mr. Maberly presented persuasively the clinical point of view, and stressed the importance of evaluating any bit of behaviour in the light of the total individual's motivational pattern as it exists at any given moment Anyone who deals with personality in the concrete is likely to agree cordially with Mr Maberly's emphasis Mr Burt apparently agrees with it, for in the present Symposium he too writes of the need for obtaining a synoptic view of the individual with the aid of 'imaginative insight. Yet at the same time Mr. Burt seems to land himself in something of a contradiction, for he affirms that it is the bounden duty of the scientist to occupy himself with *universals*, even in dealing with personality

Let us look first at Mr Burt's definition of personality, which I find to be excellent For him personality is the

> entire system of relatively permanent tendencies, both physical and mental, that are distinctive of a given individual, and determine his characteristic adjustments to his material and social surroundings [1]

Words like 'distinctive' and 'characteristic' should make Mr Burt very chary of exalting universals to the extent that he does He would have us study also the ego-sentiment, including the ego-ideal which, he admits, is a qualitative matter, and can best be 'stated primarily in words.

All this evidence of Mr Burt's sensitivity to the never-repeated patterns of personality does not, however, quite fit with his scientific conscience as expressed in his plans for the assessment of personality He wants to find a small number of independent factors, like 'key-elements in chemistry' He favours the

[1] This *Journal* 1945, Vol 15, p 107 In all essential features this definition is identical with my own, *Personality A Psychological Interpretation*, p 48.

factorial approach That he can easily reconcile this methodological preference with his own definition of personality I doubt

> Mr Burt presents the dilemma, and his preference, in the following analogy Every man's face is absolutely unique, yet should we argue that the 'common' features—the eyes, the nose, the mouth—are not true features at all? We may agree that a list of facial measurements would be no substitute for a photographic reproduction of an individual face in all its concrete completeness But equally a set of portraits, however life-like, could not by themselves suffice for scientific purposes.[1]

It is true that every man has a nose, two eyes, a mouth and chin, and that these are common and measurable features It is also true that no method of measuring emotional expression of the face has been evolved, let alone the permanent configuration or set that *is* the person's face

Yet, Burt insists, 'psychology, as a science, deals with universals, not with particulars' I am tempted to reply, tartly perhaps but also justly, that as long as psychology deals only with universals and not with particulars, it won't deal with much—least of all human personality Burt's definition of psychology as science is far more rigid and narrow that his definition of personality The consequence can only be that psychology as science is frankly and woefully inadequate to deal with personality, its natural subject-matter I wonder whether Mr Burt really wants to accept this conclusion, to which he has inevitably committed himself

Psychology, it seems to me, must be equipped to deal with the *whole* of personality, defined as Mr Burt has defined it What is 'distinctive,' what is 'characteristic' must be included The doctrine of functional autonomy helps to express the uniqueness of motives which confer distinctiveness to a person's characteristic adjustments

Our difficulty here lies in the cultish conception of science which bedevils most of us simply because of the incalculable prestige of those disciplines that have dealt so successfully with *inanimate* nature If we no longer rivet our attention to their methods (so well adapted to their subject-matter but not to ours), and if we ask what the *aims* of science are, the dilemma can be resolved Science aims to achieve powers of understanding, prediction and control above the level of unaided common sense From this point of view it becomes apparent that only by taking adequate account of the individual's total pattern of life can we achieve the *aims* of science Knowledge of general laws (including, let me repeat, the law of functional autonomy), quantitative assessments, and correlational procedures, are all helpful, but with this conceptual (nomothetic) knowledge must be blended a shrewd diagnosis of trends within an individual, an ability to transcend the isolated common variables that are obtained from current measuring devices, and an ability to estimate the ego-structure of the individual. Unless such idiographic (particular) knowledge is fused with nomothetic (universal) knowledge we shall not achieve the *aims* of science however closely we imitate the methods of the natural and mathematical sciences.[2]

In the opening article in this Symposium Mr Burt gives a conspectus of methods and principles involved in assessing personality The test-situations he has employed in his own original investigations are life-like and situational

[1] This *Journal*, 1943, Vol 13, p 7

[2] The point stated here so briefly I have argued more fully in the following publications 'The Use of Personal Documents in Psychological Science,' *Bulletin of the Social Science Research Council* (230, Park Ave, New York City), 1942, 'The Psychologist's Frame of Reference,' *Psychological Bulletin*, 1940, Vol 37, 1-28, 'Personalistic Psychology as Science. A Reply,' *Psychological Review*, 1946, Vol 54

He believes that the proper manner of treating the data obtained is by correlational techniques. He advocates the use of such variables as have been established by previous correlational studies. Examples are (*a*) a general factor of emotionality; (*b*) certain bipolar dimensions including introversion, cheerfulness, social responsiveness, and their opposites; (*c*) special factors or needs resembling McDougall's catalogue of instincts; (*d*) a measure of integration or consistency in the individual's life. He would then add (in order to repair the ravages of analysis) a 'synoptic character sketch' which 'calls quite as much for the imaginative insight of the artist as for the tabulated measurement of the scientist.'[1]

I deplore his sharp separation of the 'insights of the artist' and the 'measurements of the scientist.' Cannot a psychology of personality in the future do a better job of understanding, prediction, and control by fusing these two modes of knowledge? Burt comes close to doing so himself in his matching studies. He demonstrates what other studies have done—that the more information derived from many sources that goes into a sketch, the more easily is it matched with a criterion. It is not, however, the mere array of psychometric scores that makes matching successful, it is rather the *patterning* of the variables which turns the trick.[2] In short, successful scientific prediction requires knowledge of the essential relations which comprise the unique ego structure of the individual.

The reader will ask, 'But how concretely would you overcome the opposition between "science" and "art," and bring them into a single psychological discipline?' Though the question cannot be answered fully for many, many years I may give one illustration. Mr Burt seeks a few 'key-qualities.' He thinks their discovery will enhance our powers of predicting an individual's behaviour. So do I. But the 'key-qualities' we seek must, I submit, be *personal* and *not* universal. Each life seems to have a limited number of themes, a handful of ascertainable values and directions—true 'key-qualities.' In finding them there is an opportunity for analysis and even quantification (on a strictly intra-individual level); it is not merely by 'imaginative insight' that we make our study of unique and individual traits. Life-history techniques, matching, personal structure analysis, i.e., the search for personal but not universal factors, and other methods are already available, others will be invented. If the reader reflects on this point he will understand my insistence that the study of personality lies entirely within the scope of *psychological science*, and not—as Mr Burt seems to say—half in science and half in art.

Exclusive reliance on factorial dimensions is not acceptable, for two reasons. (1) The resulting factors are completely limited by the specific kinds of tests that happened to be thrown into the matrix. One cannot draw out more than one puts in. (2) The resulting factors are a peculiar hash of the personalities of all participants, and do not necessarily represent the living ego-structure of any single participant.

In making these criticisms I am not repudiating the use of nomothetic factors, nor of test-scales, ratings and dimensions. More of my own research and writing has been devoted to this type of approach to personality than to any other. The resulting 'common traits,' I find, have utility for *comparative* purposes, for approximations to the modes of adjustment that similarly constituted individuals in similarly constituted societies can be expected to acquire, and for the training of the young psychologists in respect to a common

[1] This *Journal* 1945, Vol. 15, pp. 110f.
[2] Cf. N. Polansky, 'How Shall a Life-History be Written?' *Character and Personality*, 1941, 9, 188-207.

language and in the use of analytical procedures What I argue is that as psychologists we must include many other procedures in our store of tools and must acknowledge the roughness and inadequacy of our universal dimensions Thereby shall we enhance our own ability to understand, predict and control By learning to handle the individuality of motives and the uniqueness of personality we shall become better scientists, not worse

VII —SUMMARY

Until recently various forms of geneticism have dominated theories of personality There has been an over-emphasis upon constitutionalism, instincts, an unchanging Id, and childhood habits Within the past few years, especially under the impact of the war, a desirable shift of emphasis to the contemporary motivational structure of the ego has occurred One theory, in line with this modern trend of emphasis, is the doctrine of functional autonomy which holds that while the transformation of motives from infancy onward is gradual, it is none the less genuine Just as we learn new skills, so also we learn new motives

A consequence of this view, disturbing to those who define science rigidly as the study of universals, is that the motivational structure of adult lives is essentially unique Egos have infinite variety Methods are now developing that will enable [illegible] 't up with and deal more adequately with this unassailable fac [illegible] of scientific and clinical psychology is false and undesirable, so too an over-sharp distinction between the methods of science and the methods of art

Since Mr Burt's views on personality are well-known, I have stated my own in comparison with his As I see it, in many respects our views are substantially identical My definition of personality agrees with his Together we repudiate the theory that 'concatenated reflexes' constitute personality We both wish to study the total person, and regard the rubrics of abnormal psychology as inadequate to the task We agree that goal-striving is the essence of personality, and that assessment is practicable and desirable In yet other respects we likewise see eye to eye

There are two chief differences (1) In my opinion personality is a post-instinctive phenomenon, and therefore reliance upon McDougallian instincts leads us into an anachronistic conception of adult motivation. Though viscerogenic drives exist throughout life (usually in an overlaid fashion), the postulation of other instincts seems not only unnecessary but fits badly with the known facts concerning the contemporaneity and individuality of the ego-structure

(2) Mr Burt, I fear, sacrifices our chances of discovering in any concrete case the essential nature of the ego-structure by over-stating the case for nomothetic (chiefly correlational) methods It seems to me improbable that a small number of uniform factors like 'key-elements in chemistry' will account for the infinite variety of normal adult motivational patterns I see more hope in the endeavour to find unique key factors (central traits) that animate an individual life Common, i e, comparable traits, whether called factors, dimensions, or what not, have a certain utility, but are at best rough approximations of what goes on in a given life, and must be used guardedly.

Instead of holding that the 'scientific' study of personality demands the use of common variables exclusively, I argue that it is possible by broadening our theory and our procedures to avoid the sharp bifurcation of scientific and clinical psychology Though less developed at the present time idiographic methods of study are basically more important—and are no less 'scientific'—than nomothetic methods

EFFECT A SECONDARY PRINCIPLE OF LEARNING

Reprinted from *Psychological Review*, **53**, No 6, November 1946, 335 347

So deftly and so incisively have Dr Rice and Dr Mowrer handled certain thorny problems of the law of effect that I hesitate to add my own comments lest in my efforts to clarify I may unintentionally becloud the issues that they have treated so ably.

The subject of this symposium as all readers know, is baffling in its complexity and in its ramifications The law of effect can scarcely be treated apart from the protean problem of learning as a whole, and this vast problem soon leads one into philosophical presuppositions which are as unavoidable as they are distasteful to most psychologists Experiments in this area, though legion, are unfortunately not compelling so far as their theoretical interpretation is concerned

In order to avoid as well as I can the pitfalls in the way, and to keep the discussion within the bounds set by the two preceding authors, I shall confine myself strictly to comment on the observations and interpretations offered by each of them The reader will recognize that the discussion in this symposium is at a fairly high level of abstractness, only the broader issues are touched upon Detailed reference to single experiments must, for the most part, be avoided lest our perspective on the problem as a whole be lost

Dr Rice's Position

Although the following summary of Dr Rice's views is sketchy, it is, I trust, sufficiently accurate to remind us of the principal features of his trenchant argument (8)

In the past, says Dr Rice, the law of effect has been inadequately formulated yet in a revised form it may retain the central position accorded it in learning theory during recent years If not actually the 'sole principle' of learning, it, along with the law of exercise, and a few other minor principles, may be considered virtually sufficient

Its primary weakness has been the assertion, or at least the implication, that a specific response becomes set through the operation of a satisfying outcome Such a picture is rigid and false While something of this sort may seem to exist in animal behavior it obviously does not apply to human reactions complicated by systems of evolved interests For example, men who are self-assertive will seldom repeat successful acts but will seek new means to satisfy their mounting level of aspiration Men who like novelty will deliberately shun a repetition of acts, so too will men who are set to solve new problems (since stereotyping of acts cannot contribute to new solutions).

In short, "the law cannot be upheld if it means that success or satisfaction necessarily enhances the tendency for either or both (a) the specific response sequence to be repeated, and/or (b) the particular, or even the specific, goal object to be chosen again" He agrees with my previous criticism that rigidly repetitive conduct is characteristic only of very young children, mental defectives, and compulsive neurotics (1) What adults normally do is to vary both goal and responses while holding only to the same general *kind* of response and selecting the same *kind* of goal that has brought good results in the past The law seems to apply better to *similar* systems than to *identical* sys-

tems, at least in normal adults, and especially in those who are self-assertive, interested in novelty, or trying to solve a new problem

Problem-solving is important. The reason men do not repeat endlessly their past success is that having succeeded, the specific problem and motive vanish A student will not repeat a course in which he obtained an A, because he no longer has this problem to solve When a new problem arises new determinants inevitably enter All that success or satisfaction does is to confirm one's interest in the general range of problems (mathematical, amatory, professional)

Self-assertion, likewise, is important, for as a motive it keeps the person in a chosen channel of conduct (persistence) in spite of repeated failures. Though not succeeding (one meaning of 'effect') the person derives satisfaction (another meaning of 'effect') from his trying For some people "to fail at a difficult task gives more satisfaction to the ego than to succeed at an easy one"

Granted that self-interest (ego-involvement) seriously alters the application of the law of effect as traditionally stated, it is none the less true that the law has a demonstrable influence upon the development of the ego itself "Though the depth psychologists have given little explicit mention to the law of effect in dealing with such matters, their stress on the importance of satisfaction and frustrations, rewards and punishment, in character formation, suggests that the development of the ego itself may be subject to Thorndike's law" Punishment to the ego sometimes deadens it—as the ultimate brutalities of concentration camps occasionally succeeded in doing Some form of reward is necessary to confirm an individual in his style of life and in his system of interests

Novelty may bring satisfaction, and if it does so, it too will violate the rigid law of repetition-of-rewarded-response Only non-recurring responses give satisfaction

All in all, the validity of the law must depend "upon what is conceived to be satisfied or thwarted, and therefore reinforced or extinguished" Normally neither specific goals nor specific means are reinforced, but rather systems of interests become confirmed through experience of satisfaction

New interests evolve from old (as, perhaps, an interest in poetry from an interest in sex), but this evolution of functionally autonomous motives is itself dependent upon the satisfactions that the *new* line of activity yields to the person

Since it is often difficult to find rewards in the environment which would explain man's persistence in the face of apparent failure, or supply an evident reason why a given system of interests is so gratifying to the individual, we must invoke, with Thorndike, the concept of self-administered rewards—the O K—delivered by the person to his own conduct.

Whether such reinforcement is applied to an interest system and course of conduct as a whole, or whether there is some specific feature in the chain that is controlled by the law of effect is not known Rice proposes the possibility that the 'core of the act' is symbolized for the individual in some way, and that the O K is directed to this core In this manner the *purpose* behind an act can be rewarded (by the self or by others), rather than any overt sequence of responses Rewarding the response is really less important than rewarding the purpose: "We show great flexibility in adapting our means to our ends, and we may change our goal-objects freely provided that the pursuit of them is expected to provide, somewhere in the

process, those qualities or structures of the act to which satisfaction has adhered."

Through symbolic responses we may weave our approval back and forth between purpose and anticipation of response and thus "as we are carrying out the successive phases of the act, we keep the symbolized purpose in mind, mull it over, and confirm it repeatedly, unswerving concentration on this purpose, as it begets auxiliary goals, is necessary to keep us going."

Confirming occurs continually along the way, so that it derives benefit from the 'gradient of reinforcement.' External reward is often slow to arrive or never occurs at all, but inner self-administered reward is immediate and therefore effective. Purpose and interests receive on the whole more reinforcement than do actual motor skills and conduct patterns. Hence we should expect the law of effect to apply to interests and purposes more than to specific responses. In sub-rational learning however the gradient effect attaches to the reward of ultimate and penultimate responses (as experiments with animals show).

Rice admits that motivation must always be conceived as operating in the present, and that dissatisfaction rather than satisfaction is the crux of motivation. "The dynamic character of an act in progress . . . derives from an immediate dissatisfaction, . . . But the interest as an enduring disposition . . . will be reinforced by repeated satisfaction. The law of effect, then, is a law of retention of interests or dispositions; it does not deal with the mechanism of the particular striving, except in so far as that is determined by past fixation or interest as one of its conditions."

Finally the operation of insight, understanding, belongingness, in learning may be explained provisionally in terms of the success that attends good solutions via the self-reward of symbols. "reinforcement may attach to the 'relevant' or 'required' features of the act."

Agreements with Dr. Rice. If my summary has been fair, I record my basic agreement with the position taken. I believe Dr. Rice is thinking in the right direction.

One feature deserves special commendation. Dr. Rice attempts more pointedly than most authors, to account for the *refashioning* of motives. He believes the liberalized law of effect is indispensable for this purpose. Instead of assuming a rigidity of drives or instincts throughout life he sees clearly that almost endless derivative motives must be themselves explained as products of learning. Though adult psychogenic motives are derivative they are in no sense *functionally* secondary. He holds therefore that new motives set up in their own right in proportion as satisfactions of some sort sustain them. Learning thus accounts for motives, not merely for skills and means.

Dr. Rice further spots clearly the defect in the concept of 'success.' It is certainly not objective success alone that helps to sustain a motive. The only reward that is operative in many cases seems to be a purely subjective sense of satisfaction. A person who persists in a hopeless task by sheer grim determination, or perhaps from a sense of duty, probably derives some satisfaction from doing so, but no success. We note, however, that in such a case 'satisfaction' is a rather vague word, for along with subjective satisfaction we find plenty of painful, frustrating, punishment, whose effects somehow or other are assumed to be offset by an inner O.K.

I agree with Dr. Rice that the traditional statement of the law of effect seems to apply much better to children, imbeciles, and animals than to normal human adults. To the latter it ap-

plies badly, excepting in routine, 'blind' learning which is wholly peripheral to the central interests of a life.

I also agree that satisfaction plays *some* part in the development of central interests and purposes An individual does mull over his purposes and plans and unless he approves of them (*i e*, rewards himself symbolically) he usually, in the long run, discards them

If the law of effect can be held in this somewhat amorphous and plastic form, I favor it. But Dr Rice, I feel, does not see fully how greatly he has attenuated the law, and how much he is forced to leave to other principles of learning Dr Mowrer, I believe, does see the consequences of this attenuation, and draws back into a far more conservative position, lest through conceding too much he discover that he has relegated the law to a secondary position in the economy of learning

Problems unsolved by Dr Rice I should like next to call attention to certain aspects of learning (particularly the learning of motives) which elude the law of effect as Dr Rice employs it

He asks what can cause an individual to persist in a 'style of life' And he answers, "Observation suggests that he does so because he has found satisfaction, actual or imaginative, from it" This statement is acceptable enough, but when we ask *why* does he derive satisfaction from it, we are again at sea There must be formative influences (hereditary perhaps) that dispose some of us to find satisfactions from aesthetic, athletic, or humanitarian styles of life The problem may seem to lie beyond the scope of the present discussion, yet it is really relevant Manifestly we learn best that which fits our own style of life, but this style turns out to be determined by antecedent conditions more basic than satisfying experience Hence effect cannot possibly be the *only* law of learning At best it operates upon systems in part established for other reasons

Dr Rice admits the satisfaction that comes from varying one's performance from non-repeated means-end solutions He proposes that novelty itself is rewarded, but the old law of effect claims only that a "response is rewarded How can it also claim that non-repetition of a response is rewarded? To do so would be to surrender completely the conception of a 'stamping in' process or of a 'retroflex arc' Dr Rice is clearly not following the classic conception of effect

To account for learning by insight Dr. Rice proposes that reinforcement attaches to the symbolized 'relevant' or 'required' features of an act I am unable to follow his argument here, because insightful solutions must have occurred *before* they can yield reinforcement or satisfaction I shall return to this problem, but mention it here to raise once more, and in a different way the question whether satisfaction can be as basic a condition of learning as even Dr Rice's moderate position would have us believe

Dr Mowrer's Position

First Dr Mowrer wishes to re-establish the argument on familiar ground (7) He therefore takes pains to eliminate concepts which imply that new principles of learning may be needed For him the *ego* is a matter of *interests* interests a matter of *emotional arousal*, and emotional arousal a matter of *ordinary drives* whose tension when reduced gives rise to the operation of the law of effect A bit hurriedly he makes this series of reductions so that 'ego-involved behavior' becomes redacted into the 'familiar drive mechanisms' Back on familiar ground Dr Mowrer then starts his argument proper He believes that the law of effect provides us with "the firmest foundation on which to develop

a truly adequate and comprehensive psychological theory"

His thesis is that "living organisms learn when, and only when, they solve a problem in the sense of reducing a tension, relieving a discomfort, deriving a satisfaction" This is the modern statement of the law of effect which Mowrer tenaciously defends

Though his defense is tenacious, he realizes that many difficulties arise in the application of the law For example, it does not tell what happens when both kinds of effects follow an act—when consequences are both rewarding and punishing pleasurable and painful; it does not tell what happens when consequences vary in time the effects being both immediate and remote In such complex cases the effect must be mediated through symbolic processes of some type The symbolic processes when well developed may be said to constitute the 'ego' and they often result in a *seeming* defiance of hedonism and the law of effect Especially when integrative or ethical conduct is in question we find much apparent repudiation of pleasure-seeking Yet ultimately the integrative or ethical aspects of ego-behavior are 'an outgrowth of the principles and processes of adjustment and hedonistic learning

There seem, then, to be no real exceptions to the proposition that 'satisfaction is the cement that makes learning stick" And by a satisfaction Mowrer means pleasure and drive-reduction This unrelenting allegiance to a hedonistic version of the law of effect reminds one of the original Thorndikean statement that "pleasure stamps in" Dr Mowrer is orthodox, even more orthodox than Thorndike, for he has little use for the law of exercise, and even less for 'belongingness'

One way to bring the psychology of learning and ego psychology together, [illegible]

interests' are secondary drives and that as such they can both motivate and reinforce behavior, in much the same fashion that primary drives do" Here Dr Mowrer accepts Rice's demonstration that interests are a learned phenomenon (learned according to the law of effect) and they function to produce new learning

In some connections Mowrer speaks of interests as 'cathexis,' in some as 'secondary drives,' but he much prefers to think of them as 'covert, emotional responses' "This terminology allows us to see 'interests' as learned by past satisfaction in essentially the same way that other responses are learned" It seems to turn out, therefore, that interest-systems are nothing more than emotional responses, and thus introduce no new problems in learning

Like Dr Rice he endorses Thorndike's theory of self-administered rewards In fact, it would not be possible to explain how a course of conduct, especially of the ethical order can be sustained, unless frequent self-administered accolades are involved

Also like Dr Rice he believes that the Gestalt principle of insight is to be explained by our OK'ing signs and symbols which are related to the reduction of tension or anticipated reduction of tension The tension relieved may be secondary, and not necessarily dependent on a primary drive such as hunger There is a constant appraising of hypotheses, censoring them and approving them along the way Such manipulation of 'danger signals' and 'safety signals' helps us 'dispel the mystery implicit in such concepts as the Gestaltists 'goodness of figure' or Thorndike's 'belonging'"

Satisfaction is derived in various ways, from reducing tension of a primary drive, from solving a problem, or from reducing a secondary drive We must also admit secondary drives of a

'high level of generality' to account for the capacity of mature men and women to persist in the face of punishment But they are not immune to the law of effect if we assume, as Rice does, that self-administered awards sustain these systems of interest

Unsolved, to Dr Mowrer's mind, is the riddle of response equivalence, "why living organisms do not immediately and permanently fixate upon whatever response or response-sequence has been found to lead to satisfaction, but instead continue to show a more or less behavior variability" The reason response-equivalence poses such a difficult problem seems to be that Dr Mowrer does not really regard interests of a 'high level of generality' as true systems If he did so equivalence would offer little difficulty (since the range of equivalence would define the degree of generality) He is clearly thinking of interests, at bottom, as a covert emotional response' So long as he does not fully accept the existence of generalized autonomous interest-systems the riddle of equivalence inevitably troubles him

Agreements with Dr Mowrer With Dr Mowrer's purpose and intent I am in agreement He wishes to find a sound, comprehensive, and adequate theory of learning He is willing to consider open-mindedly all evidence, no matter how great a strain it may place on the law of effect He does not insist upon holding blindly to the paradigm of animal learning even though he personally finds it rewarding and genuinely analogical with human learning A monumental series of experiments conducted by him underlies his theories He admits the attenuation that must come in learning theory when one considers the conflictful, symbolic, delayed, and ethical character of human conduct Valiantly he strives to include these complex forms of learning into his theory, and to make room for phenomena that have been hitherto neglected

Up to a point I agree with him also on the importance of effect In animals, young children, and in the relatively mechanical and blind learning of human adults the course of learning seems to follow fairly well the traditional statement of the law And even in interested and ego-involved behavior I would not deny that satisfaction has *some* relation to acquisition of skills, knowledge, and new motives

I agree also that ego-processes, whatever their nature, are not 'ultimate, unanalyzable, lawless' (Dr Rice's terms) As Mowrer says, they develop gradually as one ascends the phylogenetic and ontogenetic scales

Ego-Processes Are Unavoidable in Learning Theory

Dr Mowrer's rapid reduction of ego-involved behavior to 'familiar drive mechanisms' seems to me invalid His first step is acceptable enough, namely his insistence that the ego is not substantive, but merely a matter of process But it is no *more* necessary to use 'ego' adjectivally than to use 'drive,' 'personality,' 'reward,' or 'intelligence' adjectivally The ego is as valid and as necessary an intervening variable as any other Experimental evidence shows this to be the case (1)

The second step in his reduction is much too hasty Though ego-processes can, I agree, be considered equivalent to interests (Dr Rice's definition in terms of a *system of interests* being acceptable), one cannot safely go further in the reduction There is, I submit, something functionally irreducible about interest-systems, even though they are continually changing Nor is it true, in my opinion, that interest is, as Dr. Mowrer says, a familiar term in systematic psychological literature On

the contrary one of our greatest defects is our lack of consistent or adequate theory of interest That interest is not the same as 'cathexis' I stoutly maintain, for interest is a motivational term (interest residing in the organism), whereas cathexis is the superficial doctrine that this or that object becomes attached to some permanent (and usually infantile) drive or instinct The cathexis theory denies the authenticity of acquired psychogenic motives (that is to say, their functional autonomy)

Least satisfactory of all is Mowrer's reduction of ego-involvement to emotional arousal Only *certain* emotional states are ego involved Literature on concentration camps proves the point over and over again Frightful pain, terror of one's life, extreme hunger, may be perceived as 'not happening to me', while a slap, a verbal insult, a trifling humiliation may cut to the quick, and affect the entire ego-structure of the individual How often in recent years have wartime psychiatrists told us that strong egos handle the most intense emotional arousals, whereas weak egos are undone by trifling emotional arousals? Something here is playing a part besides mere emotional intensity

Or consider the course of everyday life When interest is high I find that I am learning smoothly and rapidly At such times I certainly do not feel emotionally aroused, nor are the familiar drive mechanisms sensibly involved Indeed when these drive mechanisms with their attendant emotions operate, then my learning is actually *interrupted*,—when, for instance, the needs for food, elimination, fresh air, or riddance from an annoying insect dominate my behavior Drives are normally peripheral to my ego-interests, and however important they may have been for my infant learning, they seem now to impede rather than advance my adult learning

I do not deny that some emotional arousals are ego-involved (anger, for instance, usually is) But the two states are by no means identical Therefore, any law of learning based on 'reduction of emotional tension' does not necessarily apply without modification to learning that proceeds from ego-interests To this subject I shall shortly return

Neither Dr Rice nor Dr Mowrer denies the existence of ego-processes in some sense, though both wish to show that these processes are regulated by the law of effect The picture they give for complex learning is like Thorndike's *We* find *ourselves* confirming *our* purposes, symbolized in some way to *ourselves*, by administering to *ourselves* an O K In view of this welter of ego references it would indeed be ungracious to deny the ego some place in learning theory We will, however, for present purposes pass over the epistemological dilemma into which even 'objective' psychologists inevitably fall, and limit ourselves to the role of the ego in Rice's sense of a 'system of interests'

Take the case of interests that lead to grim persistence in spite of failure No single response is rewarded, unless Dr Mowrer is right in holding that the very core of self-esteem is itself some kind of symbolic response But whether we regard the ego as a matter of specific symbolic cores (Mowrer) or as a system of interests (Rice), or as the sentiment of self-regard (McDougall), the fact remains that *it* (however defined) must be satisfied in order to maintain a course of conduct No other responses need to be rewarded for learning to occur, excepting only the ego-response This fact once more demonstrates that there is a special and selective part played in learning by ego-processes No learning theory can do without them

Again, as Dr. Rice points out, after

success or satisfaction we tend to adopt *similar* goals or *similar* acts in the future, but usually not both. If we retain our goal we vary the act (toward greater efficiency), if we retain the act it is usually in the service of an enhanced goal (as in the level of aspiration experiments). How can we explain this characteristic upward push in efficiency and goals unless we assume that the ego is playing some part over and beyond the repetition of a rewarded response? Dr. Rice correctly says that repetition of successful acts is ordinarily a mark of infantile, imbecilic or pathological behavior, rather than of intelligent adult activity. Blind repetition of rewarded response occurs only when the ego-structure is undeveloped or damaged.

The Question-begging Character of 'Satisfaction'

Both authors concede that in complex learning satisfaction often means nothing more than self-approval. We O.K. our own behavior. Or we find that a system of new interests is satisfying us. We are pleased with what we do and continue to do it (or something similar) because we are pleased. Does such reasoning carry us very far? We beg the question when we say that we do what we do because we are satisfied in doing it.

Dr. Mowrer hopes to avoid this circularity by holding fast to drive-reduction. Hence he defines satisfaction as 'the subjective consequence of solving a problem.' But why then, we ask, does one persist with unsolved problems? He would, I suppose, reply that we reward ourselves at each step for persisting. (If so, and if the law of effect were literally true, ought we not take the first step over and over again?) But the real difficulty here is that there is no independent evidence that we do in fact reward ourselves. Introspectively considered the use of self-applause is so rare and so capricious that it cannot possibly sustain the heavy load that Mowrer, Rice and Thorndike are putting on it. In any case the danger of circularity is still present: we infer from our persistence that we are rewarded, simply because we persist. No independent criterion of reward or satisfaction exists.

The reef is the same one upon which all hedonism is wrecked. Man works (and learns), it is said, because of the pleasure attained. When we ask why a martyr goes to the stake, why a bomber makes suicide dives, why an anchorite forswears all earthly joys, why a member of the underground keeps silence in the face of torture, we are told that they are seeking pleasure—paradoxical though it seems. Insofar as Dr. Mowrer equates satisfaction with pleasure, he too falls into the same trap of *claiming*, without proof, that whatever a man does is *ipso facto* pleasure-seeking.

Nor does 'drive reduction' solve the problem. It is too easy to demonstrate that learning takes place when no drives have been reduced. Suppose while using a cleaning fluid I am careless with a match and an explosion follows, destroying my house and possessions. I shall certainly learn my lesson, but what drive has been reduced? Suppose I mispronounce a word in a public speech with the result that I am ridiculed, and suffer mounting shame and discomfort. Tension has been *created*, not reduced, *dissatisfaction* and not satisfaction has resulted; but in this sequence of events I shall surely learn the right pronunciation. True, I hope to avoid such suffering in the future but there is *as yet* no drive reduction. In the year 1940 I read and learned the essential contents of *Mein Kampf* with increasing emotional tension, mounting

discomfort and acute dissatisfaction Where was the law of effect?

These and countless similar examples, contradict Dr Mowrer's statement that "living organisms learn when and only when they solve a problem in the sense of reducing a tension, relieving a discomfort, deriving a satisfaction" If the examples I have just given can be manipulated to fit the hedonistic formula, then I maintain that the formula is so loose as to be worthless In no intelligible sense in any of these cases was a tension reduced, a discomfort relieved, or a satisfaction derived

Classical Objections

Neither author alludes directly to the two standard objections to the law of effect (1) that satisfaction, being both subjective and psychical, cannot legitimately intervene as a causal factor in refashioning neural states, and (2) that effect is a complete anachronism, since the attainment of satisfaction or pleasure *follows* after the crucial series of activities, and therefore cannot well work *backward* in time (especially when a long interval of time intervenes between act and effect)

It may be that the first of these venerable objections is met by an unexpressed assumption that satisfaction has some unknown physical basis which does the actual work in modifying the equally unknown physical basis of learning, so that interactionism need not be assumed The second objection, Rice and Mowrer seem to answer through a somewhat tenuous reference to symbols (What they would say in the case of non-symbolic learning I do not know) Movements leading toward eventual success are accompanied by anticipations, which, being pleasant, invigorate, sustain, and reinforce the movements under way Some such anticipatory process may well occur, but if so, it presupposes a vast amount of foresight, intention, purpose, imagination and imagery These presuppositions are so numerous that effect certainly cannot be said to be the sole or primary condition of learning In order to operate it would require the ability to see relations, an intention to learn foresight, and a sense of what signals are relevant and which irrelevant to the anticipated path to an imaged goal There is a deal to learning besides the law of effect!

What Satisfaction Does

Up to this point my comments have been chiefly negative Yet I am as eager as Dr Mowrer and Dr Rice to discover and accord to satisfaction its rightful place in learning theory

The evidence, as I read it, establishes two facts

(1) It is easy to see that in animals small children, mental defectives, and in some peripheral phases of adult human conduct, rewarded responses tend to be repeated The bulk of experimental work on the law of effect has been done with animals, and for this reason the part played by reward in the fixation of response looms large (too large) on our theoretical horizon Close examination of the experimental results reveals that even in these simplest instances of non-symbolic learning the repeated response varies within a narrow range Even at its best, then, the law of effect works by approximation only

(2) In less mechanical forms of learning, satisfaction recedes in importance When invoked it tends to be a question-begging concept In any case its operation is secondary to the operation of a variety of other conditions of learning

What seems to happen in normal human learning, beyond the infant stage, is that experiences of satisfaction serve as *indicators*, which, valuable as they are to the individual, are not dynamically decisive If I am trying to be-

come a writer and am downcast by a rejection slip, I *may* thereupon cease the style of work that I was attempting. Or I *may* search the slip for encouragement between the lines, and thinking I have found it persist in my style, varying it for a better effect in the future. Knowledge of results is useful in telling me whether I am getting toward my goal. Good news tells me I am on the right road. Yet I *may* be so sure of myself (in my ego-structure) that I will persist *in the face of bad news*. To say that I am really 'satisfied' by bad news, or that I offset it by giving good news to myself, is dangerous reasoning. The rejection may be bitter to bear, my self-administered praise may be pallid and faint. Would it not be truer to say that in persisting I am refusing to use the indicators of pain and pleasure, and am treating 'these two impostors just the same'?

Satisfaction and dissatisfaction then are useful indicators but according to the nature of my ego-structure I treat them in a variable manner. Having had a good meal at Restaurant X, I am likely to return when my hunger drive is uppermost. But having been highly satisfied with a score of 89 at golf, I risk failure by setting a goal of 85 for myself. Or, in carrying out some plan in which I meet a painful rebuff, I decide, conditions being what they are, that I cannot afford to take this cue but must persist in my conduct and risk repeated rebuffs. In all these cases there are other determinants at work beside the useful but not decisive indicator of effect.

I think Carr was essentially right in holding that the consequences of an act help us in the future to *perceive* the situation giving rise to the act in an altered way (5). Effect thus becomes *one* of the factors in the perceptual situation. This view, incidentally, helps us escape the paradox of the retroflex. Satisfaction does not stamp in after the fact; it merely alters the determining situation when next it (or a similar situation) recurs.

Although Dr. Mowrer views all learning as a matter of S-R connections, he seems consistently to discount S and to magnify R. To his way of thinking an S is useful chiefly to 'trip off' a response. To my way of thinking the S (including external and internal pressures) is far more decisive.

Effect: A Secondary Condition of Learning

In view of these many difficulties, I submit that the term 'law' is too flattering a designation to apply to the variable operation of consequences on behavior. A law should have greater and more uniform subsumptive power. The 'law of effect' is, of course, an entrenched habit of professional speech, but it would be far more accurate at the present time to speak of a *condition* rather than *law* of learning.

From the foregoing argument it appears that effect cannot be considered the primary condition of learning, certainly not its sole condition. As applied to complex forms of learning its weakness lies in its two ruinous ambiguities: *satisfaction*, as we have seen, is often a question-begging concept, and *symbols* (hopefully invoked to represent some hypothetical core-response which is somehow self-rewarded) are vague molecular constructs that taper off into a kind of aimless triviality so far as explanatory power is concerned.

To hold, as I do, that effect (as an indicator in the perceptual situation) constitutes a secondary condition of learning is, of course, to invite the natural question: What then are the primary conditions? Since this query opens up the entire problem of learning with its crowded history of attempted

solutions, it falls beyond the scope of the present discussion

Yet we may hazard the opinion that an adequate learning theory will have to allow a prominent place to the following basic phenomena

Typically a person learns when he is trying to relate himself to his environment, under the combined influence of his motives, the present requirements of the situation, active participation, and a knowledge of relevant facts, including a memory of his previous success and failure In this process the role of any previous specific response (rewarded or unrewarded) is not decisive, but is only one determinant among many.

Occasionally, but not often, the process of relating oneself to the environment is so simple that only one segmental drive requires a reduction of tension (for example dust on the cornea leads ultimately to successful blinking or use of the handkerchief, and these responses under like circumstances tend to recur). In such conditions of low complexity, and in animal learning, where ego-structure is undeveloped or, for the occasion, is not engaged in the activity in question, the traditional statement of the law of effect applies fairly well

One primary condition of learning, not reducible to effect, is the influence of motor activity and participation. Even simple motor involvement speeds up learning (6), but ego-involved participation speeds it up still more (2) There are other familiar conditions of learning which still resist various attempts to reduce them to effect, *viz*, recency, primacy, exercise, temporal contiguity (classical conditioning), and what Tolman calls 'sign-significance' A certain amount of 'incidental learning' is likewise unaccounted for

Further, before effect can be invoked as a principle of complex human learning, several *preconditions* must be assumed In addition to the motive power of psychogenic interests, one must assume that organisms have a power of administering rewards through a self-conscious and reflective act, that they are able to imagine, foresee, and anticipate goals before they are reached, that they have 'faith' in imagined solutions; that they can test for relevance and fitness of a proposed act.

The assumption of so much rational equipment leads again into the problem of dynamics. It has never been successfully proved that complex learning may proceed without what Leibnitz called an 'active intellect' In modern times this condition of learning has been represented under such terms as *Gestaltdrang, closure, curiosity, structuring, figure-ground, trace organization,* and *pursuit of meaning* One thinks here too of Tolman's 'law of emphasis' It seems impossible to write a comprehensive account of human learning without invoking intellectual dynamisms of this order To my way of thinking, the interpretations of the law of effect offered by Rice and Mowrer *presuppose* them

Above all, learning seems to follow the channels of acquired interests Complex interests bear little or no resemblance to the 'familiar drive mechanisms,' even though they may originally have derived therefrom (3) It is indefensible to speak of them as 'secondary drives' unless the term secondary is used in a strictly chronological sense Mr X, let us say, has, in addition to his quota of primary segmental drives, a series of interests in his children's welfare, in fishing trips, in philately, in the cleaning and dyeing industry, and in Catholicism. He learns almost everything that crosses his path provided it has any perceived relevance to any of these interests

Interest, in this sense, seems to op-

erate almost like a sponge Anything that has interest-relevance (= ego-relevance) is absorbed—subject, of course, to the limitations of fatigue, intellectual capacity, clear perception, and other similar conditions What is learned on the basis of this interest-relevance sometimes serves to reduce tension, but often has some other effect Occasionally, for instance, it serves to increase tension, as when a pianist is memorizing a program for his concert début But always the learning has some important relation to an interest The only statement we seem able to make at present is that an interest causes learning which somewhere fits into the interest-structure

It is true that, in the long run continued punishment and dissatisfaction are likely to weaken or eliminate an interest system, just as the law of effect maintains We have evidence, however, that often this result is brought about only at the price of destroying the entire ego-structure of the individual In concentration camps it often took three to five years of uninterrupted punishment and pain to break down the desire of a person to 'remain the same' (4). In the short run, learning proceeds because it is relevant to an interest-system it adds to knowledge, it differentiates items within the system, it broadens the range of equivalent stimuli, it does all sorts of things that tend to complete, to round out, or render the interest incisive. Pleasure attending a single response, or even concatenations of response, is not decisive

Interests, of course, are not separate and unrelated systems They interlock and comprise the structure of a personal life The best designation for the resulting *pattern* of interests seems to be 'ego-structure' Here is our reason for saying that ego-structure is a far more fundamental condition of learning than is the law of effect

Yet, I repeat satisfaction often enters into the process of learning as an indicator to the individual that his behavior is or is not appropriate to his own ego-structure Dissatisfaction characteristically attends his failure to relate himself to his environment adequately, satisfaction accompanies some successful move or anticipated move Yet it is common for the ego-structure to be so organized that these indicators are disregarded Interests often persist in the face of continuous dissatisfaction and failure If liberties are taken with the meaning of 'satisfaction' so that anything a person is doing is said to yield him satisfaction, then the term becomes so broad that it is question-begging, and loses its explanatory value

In fine, effect is a useful indicator sometimes playing a role in the total perceptual situation that guides the individual in the pursuit of his interests But its role is contingent upon, and in this sense secondary to, the total psychological and environmental situation that prevails

SUMMARY

The three authors in this symposium are unanimous in their desire to establish a learning theory fully adequate to the phenomena of complex human adult learning They agree in seeing certain defects in the traditional formulations of the law of effect They all mark, for instance, the fact that rigid repetition of successful responses practically never occurs, and that the law seems to work principally by a curious approximation, affecting 'similar' responses, 'equivalent responses' or a whole 'system' of behavior

Dr Rice believes that interests are the key to learning, but that they themselves are the product of past satisfaction or dissatisfaction, Dr Mowrer believes that interests are re-

ducible to the familiar drive mechanisms and attendant symbolic core-responses For the former author effect is a primary law of learning for the latter author, the sole law

My own argument holds that the vagueness that must result from extending the principle of satisfaction to cover all phenomena of learning (at the higher level of complexity) is such as to disqualify it as a 'law' At certain low levels of mechanical learning, it may suffice but at the adult human level satisfaction is at best a *cue*, of quite secondary importance and often disregarded Its effectiveness depends on other more important conditions of learning Of these the interests that comprise the ego-structure of the individual are clearly dominant

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PERSONALISTIC PSYCHOLOGY AS SCIENCE: A REPLY

Reprinted from *Psychological Review*, **53**, No. 2, March 1946, 132-135

In a recent number of this Journal Dr. E. B. Skaggs expresses his conviction that 'idiographic' knowledge does not deserve to be called 'scientific' (5). It would not be profitable to dispute this statement of semantic taste; for *science*—a 'purr word,' highly charged with positive affect—is at the present time peculiarly resistant to a dispassionate search for its most appropriate referent. And yet I cannot let Dr. Skaggs' confession of taste pass unnoticed because in stating his preferences he has unintentionally misrepresented some of my own views regarding the methods and theories suited to the study of personality.

He writes, "Now any system of personalistic psychology, such as that presented by Allport, where the effects of learning are stressed so heavily and where individual uniqueness constitutes the data of study, cannot meet the criteria of scientific data or content" (5, p. 237). The criteria for scientific subject-matter, he proposes, are (*a*) durability in the phenomenon that is the object of the scientists' interest, and (*b*) the universality of this phenomenon.

My first criticism arises from his inaccurate understanding of personalistic psychology. It so happens that there is only one self-styled system of personalistic psychology, namely that set forth by William Stern. A reading of his *General Psychology from a Personalistic Standpoint* (6) shows that Stern's dimensions (or variables) almost without exception fulfill the criteria of durability and universality. In fact, Stern's writing is as nomothetic as one's heart could possibly desire. Hence, to identify personalistic psychology and the idiographic outlook is Dr. Skaggs' first serious error.

If he wishes to label my own views 'personalistic' I cannot prevent him, but because of the many differences between Stern's 'system' and my own, I myself would hesitate to accept the label. Stern has prior rights to it. In Chapter 20 of the book that Dr. Skaggs criticizes I have explained in some detail the differences between personalistic psychology and the psychology of personality as I see it (1). Elsewhere I have summarized Stern's views at still greater length and again recorded my criticisms of them (2). Dr. Skaggs seems far more certain than I that I am a 'personalistic' psychologist.

In attacking the idiographic point of view (which, as I say, is not the same as the personalistic point of view), Dr. Skaggs writes, "Literally there would be as many separate psychologies as there are individuals, if we carried Allport's doctrine to the extreme!" (5, p. 237). Such a statement is like saying, "Penicillin is good for everything, including near-sightedness and ingrowing toenails, if we carry the penicillin-enthusiast's view to the extreme." Who wants to carry it to the extreme? Not I. In discussing the proposed distinction made by Windelband and others between the nomothetic and idiographic approaches to mental life, I state explicitly, "The dichotomy, however, is too sharp; it requires a psychology divided against itself. As in the case of the two psychologies (the analytical and the descriptive) advocated by Dilthey and Spranger, the division is too drastic. It is more helpful to regard the two methods as overlapping

and as contributing to one another A complete study of the individual will embrace both approaches" (1, p 22) The psychology of personality, I have therefore explicitly maintained, should be *both* nomothetic and idiographic

Again, Skaggs writes, "Allport, who so severely criticizes the older scientific psychology which dealt with facts common to all mankind, ends up by *abstracting certain general laws and methodologies!*" (p 236) Why, may I ask, is this so scandalous? Why should not a discipline that is *both* nomothetic and idiographic deal with common laws and methods? For that matter, why should not a discipline almost entirely idiographic in nature, such as history, fine arts, or medical diagnosis, employ as background laws and common methods in so far as these are helpful in comprehending uniqueness?

Dr. Skaggs goes on to state correctly my aspiration when he says that the difference between "his laws and methodologies and those of a Wundt or a Titchener lies in the fact that his are (presumably) more serviceable in giving self-understanding and understanding of other people" (p 236) Dr. Skaggs is right. I try in my book to offer nomothetic constructs that *improve* upon those traditionally employed While they are nomothetic in nature, many of them have an idiographic *intent* To illustrate. such constructs as the theory of individual traits, of the ego, of functional autonomy, of congruence, of the empirical-intuitive nature of understanding, all are generalizations which if adopted would give psychologists greater predictive ability in dealing with single individuals. Similarly, among the *methods* having idiographic intent, and emphasized by me, are the case study, the personal document, interviewing methods, matching, personal structure analysis, and other procedures that contrive to keep together what nature itself has fashioned as an integrated unit--the single personality My whole purpose is to show how the psychology of personality can do a better job than it has traditionally done in handling the phenomenon of individuality

But Dr Skaggs is not pleased To him it seems mildly treasonable to suppose that science can extend itself to the phenomenon of individuality He writes, "If we define personalistic psychology as does Allport [the error here I have already explained] each person is a 'unique individual'" (p 236) My reply to Dr Skaggs is that each person *is* a unique individual regardless of who defines what how

Although I am apparently more impressed than he by the inescapable uniqueness of personality, and by the psychologist's obligation to deal with it, I think I allow adequately for the contributions of the familiar actuarial methods of our discipline For example, there is merit in the postulation of universal needs and capacities, and in their measurement in the customary language of individual differences All testing (of the standardized order) must, I fully grant, proceed from the assumption of 'common traits' Uniqueness in respect to any single variable is known only in terms of its *deviation* from the mean of the standardization group with which the individual is being compared Where my view is 'unorthodox' is in my contention that psychological science (and I mean here the total course of psychological inquiry) cannot stop with common traits, factors, IQ's, and like nomothetic dimensions, but must admit additional methods and theories to handle the organic inter-relation of the artificialized variables with which nomothetic science deals, and must represent better than it has the personalized coloring of these variables in the individual life I say in effect "No doors

should be closed in the study of personality. Abstract dimensions have their place. Let us use them even though they merely *approximate* the unique cleavages which close scrutiny shows are characteristic of each separate personality Then let us add new methods and concepts where they are needed to grasp better than we have the phenomenon of individual pattern"

The most startling feature of Dr Skaggs' position is his contention that the biological aspects of personality are legitimate data for science whereas the acquired aspects are not (p 237) He rules out "such content as ideas, ideals, attitudes, interests, sentiments, purposes, beliefs, idealogies [sic], 'personality traits'" because these "are definitely not common to all people the world over" (p 235). He maintains that whatever is learned cannot be the object of scientific interest, because learning results in progressive individuality I daresay that biologists and geneticists would be glad to call Dr Skaggs' attention to the *unique* inheritance that results from combinations of genes An inborn temperament is certainly no less unique than acquired habit-systems, and, I suspect, not nearly so universal

Yet he insists that "any effects wrought in man through experience or learning would be unscientific content for psychology because they would not meet the criteria of durability and commonness" (p 237) To draw the line here would exclude from the scope of science such pursuits as market research, opinion study, vital statistics, comparative national psychology, humor, custom, much of psychopathology, and, if I understand him correctly, most of the phenomena of perception, memory, judgment, reasoning, language, and motivation, for these are all variable and socially conditioned

To the purged hall of science he would, however, admit such constructs as Spearman's *g* and Thurstone's 'basic factors'. (p 235) Yet Tolman has shown clearly that nothing is more culture-bound than precisely these factors Who, knowing the type of culturally conditioned test-matrix from which factors emerge, can deny Tolman's conclusion that "it is quite obvious that this London (or New York) *g* would not carry over, as such, to the Trobriand Islands"? (7, p 2) And I question whether Dr Skaggs is on safer ground with his contention that learning theory, or the Weber-Fechner law, is of eternal and universal applicability, for the operation of both, I suspect, is so basically dependent upon culture-bound and personality-bound interests, that the purely biological component is not only impossible to isolate, but worthless when isolated

The author insists that "science as we know it to-day, thinks in terms of millions of years" (p 238). If this be so, I doubt that any biological or psychological discipline qualifies unless its subject matter be trilobites or something else equally remote from human concern The author's insistence upon durability and universality in the phenomena under investigation would, it seems to me, disqualify nearly every psychologist now at work Oddly enough, Stern, the personalistic psychologist, would qualify as well as anyone, for his dimensions for the study of mental life are highly abstract and in themselves nearly content-less

It is much more customary to define science as that form of knowledge that enhances our ***understanding, prediction,*** and *control* of phenomena above the level achieved by unaided common sense Elsewhere I have argued that in order to attain a higher degree of scientific power thus defined, psychology would do well to adopt the idiographic orientation of its work (3). For in

matters of mental life *understanding*, *prediction*, and *control* are likely to be more complete when the single organism is understood in its own special uniqueness than when exclusively nomothetic (actuarial) probabilities are applied Although this point reaches beyond the scope of Dr. Skaggs' paper I mention it here because if I am correct in my analysis of the situation then according to this *more usual* definition of science, idiographic knowledge fully qualifies for a place of honor

True this claim that understanding, prediction and control of personality are better achieved under an idiographic than under a nomothetic mode of approach, has been disputed But in principle, at least the hypothesis can be submitted to experimental testing I have already cited some evidence in its favor (3, p 34), Sarbin some against (4). The subject is not yet closed I shall not discuss it more fully here, because it digresses too far from Dr Skaggs' argument

In the last analysis his position, I regret to point out, turns on a struggle for status, the motive being revealed in several passages

"Allport takes a bold stand for the broadening of the concept of science This may be the proper progressive stand to take but we doubt that our fellow scientists in physics chemistry and astronomy will be very receptive to the idea' (p 234)

'While the study of attitudes, beliefs, habits and skills may be of immense practical and theoretical importance, such studies are not science in the eyes of our colleagues in physics chemistry and astronomy (p 237).

Our colleagues in physics and chemistry might, and probably would resist any such change in the scientific concept' (p 238)

'When a colleague in physiology or chemistry tells us that our data are not scientific, we become rather upset' (p 238)

"We all want to bask in the light of the great Sun-God Science" (p 238)

In short, psychology, the climber, must not offend those who have arrived If it does so, it won't make the club

This logic of appeasement has little attractiveness for me Prestige for psychology will scarcely be won by aping those who, at this particular moment in the world's history, enjoy exalted status. Rather, when psychology has ripe wisdom to offer concerning the development of human personality, whether it offers it in a nomothetic or idiographic manner (or both), it will then merit the high position which Dr Skaggs covets for it

Though I have disagreed with him in his interpretations and outlook, I am grateful to Dr Skaggs for initiating a discussion of such basic issues in the study of personality, and for the opportunity he has given me to clarify some of my own views on the subject

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SCIENTIFIC MODELS AND HUMAN MORALS[1]

Reprinted from *Psychological Review*, 54, No. 4, July 1947, 182-192

Within the span of remarkably few years, the quantity and quality of investigations in the fields of personality and social psychology have established not only their scientific dignity but likewise their popularity and promise within the psychological profession. The official formation of this large Division within the American Psychological Association is a formal recognition of these facts.

At the same time the significance of this occasion extends beyond the boundaries of the profession. In forming this Division we are, wittingly or unwittingly, stating our readiness to assume a certain responsibility. We are announcing, in effect, that as a group of scientists we believe we have a contribution to make in interpreting and in remedying some of the serious social dislocations of today. For if we did not believe in the potentialities of our science would we thus formally establish it?

The test of our fitness to exist and to prosper, I submit, will be our ability to contribute substantially in the near future to the diagnosis and treatment of the outstanding malady of our time. The malady I refer to is not war, for modern warfare is but a symptom of an underlying morbid condition; it is not the threatening fission of one world into two, ominous as this threat may be; nor is it our apparent inability to control for our safety and profit the transformation of matter into atomic energy, though this crisis too is now upon us. I speak rather of the *underlying* ailment of the fact that man's moral sense is not able to assimilate his technology.

While technological warfare, technological unemployment, and the atomic age—all by-products of physical science—have overtaken us, mental and moral science have made no corresponding gains in allaying the rivalries and anxieties induced by technology, in devising methods of social control, nor in enhancing human cooperation and solidarity. It is, I venture to point out, precisely our own young science, whose formal establishment we are now celebrating, that has failed to keep pace with the needs of the times.

In taking stock of the situation I observe how many of us seem so stupefied by admiration of physical science that we believe psychology in order to succeed need only imitate the models, postulates, methods and language of physical science. If someone points out the present inutility of mechanical models in predicting any but the most peripheral forms of human behavior, we are inclined to reply: Wait a thousand years if necessary and you will see that man is a robot, and that all his mental functions can be synthesized in kind as successfully as we now synthesize table salt, quinine, or a giant calculator. While we righteously scorn what one of us has called "the subjective, anthropomorphic hocus pocus of mentalism" (6), we would consider a colleague emotional and mystical should he dare speak of "the objective mechanomorphic hocus pocus of physicalism."

Let our progress be gradual, we say. By sticking to peripheral, visible operations we may some day be able to ap-

[1] Address of the Divisional President before the first annual meeting of the Division of Personality and Social Psychology of the American Psychological Association, September 4, 1946.

proach complex problems of motivation, and then come within hailing distance of the distresses of mankind We hope that these distresses will keep a thousand years until we are ready to cope with them, and that in the meantime a free science will be permitted to linger along and take its time But even if such improbable conditions were fulfilled, I question whether we should endorse this counsel of patience or the premises upon which it rests

The machine model in psychology had its origin not in clinical or social experience but rather in adulation of the technological success of the physical sciences Since psychologists, like everyone else are enmeshed in the prevailing ethos, they too, unless especially on guard, are likely to allow their subservience to technology to outrun their moral sense

Besides the mechanical model, there are two other currently popular paradigms in psychology that are, in my opinion only slightly less inept in guiding significant research or theory concerning the foundations of social morality I refer to the phylogenetic model and to the infant mind Although both these patterns during the past two generations have brought new insights and correctives into our work, they have not proved adequate to the needs of clinical, personnel, and social psychology

THE CURRENT APPEAL TO PSYCHOLOGY

Public officials, confronted by postwar dilemmas, are urgently seeking the aid of psychologists Many of us who have been approached are embarrassed by the scarcity of scientific findings, and even of serviceable concepts and well-formulated problems, that psychology has to offer *of the type that is being sought* What is asked for is instant help in discovering the sources and conditions of man's moral sense in order that this sense may be enlarged and brought into focus What is asked for is aid from a science of human relationships whose assistance Franklin D Roosevelt likewise invoked in his last speech before his death.[2] Yet we may comb the entire file of the *Psychological Abstracts* and find very little that has any bearing upon the improvement of human relationships on an international scale

Why have we so relatively little to offer? Is it that we are young and need to follow the machine model for a thousand years? Or have we gotten off to a thoroughly bad start through our adoption of root-metaphors that lead away from, rather than toward, the problem at hand? Three generations ago psychology was commonly classified as a "moral science" Though we may not favor the aura of this term, how can we expect anything other than a science of moral conduct to discover conditions that will bring the needed counterpoise to technology run wild?

When any one of us undertakes a piece of research he inevitably adopts, according to his preference, one or another of the fundamental models available to psychologists My thesis is that now if ever we need to test our preferred model for its capacity to yield discoveries that have some sure relevance to moral nature and to social skills

EXPECTANCY AND INTENTION

If I interpret the matter correctly, American psychology naturally adopted mechanical models because our culture has always been action-oriented and technological By and large our psychology is a motorized psychology, and is only now widening its concept of ac-

[2] "Today we are faced with the preeminent fact that, if civilization is to survive, we must cultivate the science of human relationships—the ability of all peoples, of all kinds, to live together and work together, in the same world, at peace"

tion to include the ego-involved participation of the human organism in matters affecting its own destiny (2) The earlier extreme position, represented by E B Holt and J B Watson, held personality to be essentially a battery of trigger-release mechanisms This view paid no attention to the sustained directions of striving characteristic of moral behavior, to what in this paper I shall call "intentions"

This trigger-model, still preferred by a few, gave way gradually to a more purposive behaviorism The concept of "sign-Gestalt expectancy" was introduced by Tolman, and mercifully shortened by Hilgard and Marquis to "expectancy" (9) It is an interesting fact that these authors seem to regard the principle of expectancy as the most purposive of all the essentially mechanical theories derived from the multitudinous experiments on the conditioned reflex (9, p 101) In other words, some version of the principle of expectancy is as far as many psychologists have come in their conception of the nature of personal and social conduct

The principle holds that in the presence of certain signs the organism expects a certain goal to appear if it follows the customary behavior route If the goal is reached, the expectation is confirmed, if not, the organism may vary its behavior (9, p 88) The principle, while allowing for the importance of attitude, is essentially stimulus-bound We behave according to the cues we have learned, according to our expectancies

In order not to complicate my argument I shall leave out of consideration the law of effect, which, it would be easy to show, likewise ascribes behavior wholly to past experience, to learned cues, and to mechanical reinforcements (4) Both principles, so far as I can see, accord nothing to the *un*rewarded, *un*realized yet persistive, intentions of man's moral nature

The trouble with these currently fashionable concepts, drawn from the phylogenetic model is that while they seem to apply aptly enough to animal behavior whence they were derived they have only a limited or else a remote analogical bearing on the activities of human beings We may know a person's expectancies and even his past rewards, and yet be singularly unable to predict or control his future behavior, unless at the same time we know also his basic intentions which are by no means a stencilled copy of his previous expectancies and rewards (3)

To take an example, the sign-Gestalten today are such that we may now reasonably expect future trouble with Russia Does this fact tell in any degree what we can should, or will do about it? This precise area of conflict is a novel one (as indeed all important situations are) The best predictive basis we have lies in our own national and personal *intentions* regarding Russia It is our purposes, not our expectancies, that are now the issue

As if aware of the scantiness of the expectancy principle, Tolman advises us to embrace also a "need-cathexis psychology" (19) But the situation here turns out to be parallel Need-cathexis psychology—of course I oversimplify—holds essentially that a handful of physiological drives get attached to this, that, or the other object A man who, in Tolman's pleasing vernacular, is "raised right" meshes his drive into a socially acceptable gear A man "raised wrong" does not But what is so striking about human motivation is that so often a desire or aspiration is meshed into no gear It simply reaches forward hungrily into the future like the tip of a scarlet-runner bean groping for a goal that it does not know about

The embarrassment of the need-ca-

thexis type of psychology is reflected in the apologetic language it uses when referring to this expansive aspect of human motivation. Accustomed to work with animals or with infants, need-cathexis psychology labels adult human intentions "secondary drives," "derived drives," or "drive conversions." With such depreciating concepts both the mechanical and the phylogenetic psychologists apparently seek to dispose of those morally relevant desires and aspirations that are in fact so different from the drive-impelled excursions of the cozy robot or cozy rodent.[3]

My objection to the animal paradigm for personality and for social psychology is not so much that animals lack culture—a fact which Mr. Tolman in his sparkling paper first frankly admits and then amiably represses. My objection is rather that the motivational structure of man and of lower animals seems to be in only a slight degree similar. In this respect as with his evolutionary brain development, "Man," to quote Julian Huxley's conclusion, "stands alone" (12). Animals are demonstrably creatures of stimulus-expectancy and need-cathexis. Man, in all that is distinctive of his species, is a creature of his intentions. We may well doubt that the basic equation for intentional morality, or that for intentional learning, can be written from a study of organisms that lack propositional symbols. To this point I shall return.

While I am disapproving of current models I shall state my final grievance, this time against the rigid ontogenetic stencils that derive from Freudianism. Odd as it may appear, Freud resembles the mechanical and phylogenetic psychologists in wanting his doctrine of motivation anchored to neuro-anatomy. I assume that this is his desire because of his refusal to see anything at all in the cooperative, socialized, affiliative, undertakings of mankind excepting goal-inhibited sexuality. To the sex drive he adds principally the impulses of aggression, destruction, and death. It seems obvious that Freudianism, even though eagerly adopted by many who have found the mechanical and animal models inadequate, offers an equally meagre basis for a serviceable study of man's moral conduct.

The trouble lies chiefly in the excessive emphasis upon infantile experience. We are asked to believe that an individual's character-structure is, in all essentials, determined by the time his last diaper is changed. Even Suttie, who

[3] It is instructive to read the perorations of two recent presidential addresses by psychologists, one preferring the machine model, the other the rat model. Though good-humored and witty, both authors candidly acknowledge their own escapist motives. To paraphrase Carlson's quip concerning Cannon's theory of emotions, the authors seem to entertain their models because the models entertain them.

"I believe that robotic thinking helps precision of psychological thought, and will continue to help it until psychophysiology is so far advanced that an image is nothing other than a neural event, and object constancy is obviously just something that happens in the brain. That time is still a long way off, and in the interval I choose to sit cozily with my robot, squeezing his hand and feeling a thrill—a scientist's thrill—when he squeezes mine back again" (6, p. 192).

And, as a final peroration, let it be noted that rats live in cages, they do not go on binges the night before one has planned an experiment, they do not kill each other off in war, they do not invent engines of destruction, and if they did, they would not be so dumb about controlling such engines, they do not go in for either class conflicts or race conflicts, they avoid politics, economics and papers on psychology. They are marvelous, pure and delightful. And, as soon as I possibly can, I am going to climb back again out on that good old phylogenetic limb and sit there, this time right side up and unashamed, wiggling my whiskers at all the dumb, yet at the same time far too complicated, specimens of *homo sapiens*, whom I shall see strutting and fighting and messing things up, down there on the ground below me" (19, p. 166).

postulates as the foundation of morality an original and embracing instinct of tenderness, affection, and social symbiosis, believes its fate is sealed according to the manner in which the mother handles this affiliative impulse before and after weaning (17) If the chances for peace in the world depend to such a degree upon infant fixations ought we not disband this Division and register as wet nurses to the mewling citizens of tomorrow?

The concept of intention, which I am here opposing to reactivity, expectancy, and infantile fixation, is not immediately congenial to American psychology Yet its adoption in some form or another, I argue, is necessary With some malice aforethought I have selected the term *intention*—spiced, as it is, by an aggravating flavor of mentalism—to signify those aspects of thought and of motivation that play a leading, but now neglected, part in the complex, affiliative, moral conduct of men I believe it is precisely the "private" worlds of desire, aspiration, and conscience that must be studied if we are to succeed in the task of social engineering

In using the term intention, however, I am not arguing surreptitiously for phenomenology, though in order to improve our grasp on the subtleties of man's intentions we would do well to emulate the refinement of its descriptive method[4] Nor am I arguing for a revival of Brentano, though we have neglected unduly the central proposition of Act Psychology that at every moment man's mind is directed by some intention be it loving, hating, comparing, understanding, desiring, rejecting, planning, or some similar mental act.

Let us define intention simply as *what the individual is trying to do* Naive as this definition may sound it is in reality the product of decades of sophisticated wrestling with the problems of human motivation In this concept influences as diversified as Brentano, Darwin, Freud, Cannon, and Wertheimer are brought into focus In essence it no longer draws the sharp distinction, advanced by both Kant and Schopenhauer, between will (or drive) on the one hand, and intellect on the other The machine, rat, and infant models we have been following (though I am sure they'd be surprised and grieved to know it) preserve this irreconcilable Kantian dichotomy They side somewhat more, however, with Schopenhauer in regarding the functions of the intellect as wholly instrumental and secondary Without forgetting for a moment what we have learned about rationalizing and about the untrustworthiness of introspective reports on motives, we may safely declare that the opposing of motive and thought-process has gone much too far Usually the individual is trying to do something in which his wants and his plans easily cooperate Instead of being at opposite poles his emotion and his reason canalize into a single endeavor. The direction of his endeavor I designate as the intention, and offer this concept as an improvement upon the one-sided irrationalistic doctrines of drive, need, instinct, and cathexis.

In deference to the discoveries of psychoanalysis we readily admit that an individual does not always know precisely what his own intentions are. *Consciously* he may misinterpret the line of his own endeavor A neurotic

[4] An excellent example is Bertocci's analysis of man's sense of moral obligation (5) He shows that when we study the *ought-consciousness* phenomenologically we discover how entirely different it is from the *must-consciousness* This discovery leads to a justifiable suspicion that, whatever conscience may be, it does not derive merely from fear of punishment or from social coercion Too hastily and heedlessly have psychologists accepted Freud's identification of the Super-ego with threat of parental punishment

frequently does so In such cases insight is either lacking or partially lacking. But as a rule, the "posture or lay of consciousness" reflects accurately enough that inextricable fusion of driving and planning which we find in the dynamics of mature human conduct[5]

It is the mark of an intention that it is directed toward the future. Yet it is typical of the models we have followed that they lead to preoccupation with adjustments in the past While people are living their lives forward, psychologists are busy tracing them backward The model we need for our investigations of human relationships will escape from our present excessive dependence on geneticism in all its forms (3)

A geneticist, for example one who places great weight on the expectancy-principle, is inclined to define personality as a peculiar set of reaction-tendencies. An intentionist, on the other hand, sees personality as a peculiar set of subjective values. There is a difference The one learns at best only about moral *accomplishment*, the other gains additional light on moral *potential*

[5] McDougall specifically objected to the concept of intention on the grounds that conscious intention merely obscures the instinctive motive at work (15, pp 121f) He had in mind the indubitable fact that men's verbal reports of their intentions may be rationalizations But in my use of the term I do not confine intention to reportable purpose Sometimes the essential direction of an intention is understood well enough by the subject, sometimes not If the term, as I propose, is taken to mean *both* the understood and non understood direction of an act I maintain that it can serve as a proper designation for "ultimate motives' and not merely for proximate or rationalized motives

To my mind it is unnecessary to have recourse to a doctrine of underlying needs or instincts McDougall for example, allowed far too little for the ever-changing panorama of man's intentions which, as they evolve from an original genetic equipment, undergo complete change of form and functional significance (1)

It may be argued that the models I am presuming to criticize do deal both with "goal reactions" and with "anticipatory goal reactions" Dr. Hull, for example, offers "anticipatory goal reaction" as a "physical mechanism" which he says he regards as equivalent to the concept of "guiding ideas," or what I am calling *intention* (11) The difficulty with "anticipatory goal reaction" as with "expectancy" is that men often have values without having any specific goal in mind. They may have a consistent direction of striving, but their goals are either transient or else undefinable All of a rat's, but only a small bit of human, behavior can be characterized in terms of concrete goals whose attainment will de-tension specific drives For the most part the course of man's behavior runs according to certain schemata, or in prolonged channels Only now and then are these channels marked by lights or buoys that represent specific goals.

A simple example may be borrowed from Lecky's analysis of childhood thumbsucking The following statement distinguishes neatly between expectancy and what I am here calling intention; that is, between behavior regulated by habit and behavior ordered to non-specific schemata

"Certainly the child who sucks his thumb gives the act plenty of exercise and gets enough satisfaction from it to fix it indelibly Therefore if the habit theory is true, we should be able to predict absolutely that the child will continue to suck his thumb for the rest of his life But what really happens? Every year millions of children who have industriously sucked their thumbs since birth, and who have successfully resisted every effort to force them to change their behavior, quit the practice spontaneously when they are five or six years old The reason is that they are beginning at this age to think of themselves as big boys or girls, and they recognize that thumb-sucking is inconsistent

with the effort to maintain this new idea" (13, p 122f).

An intention often takes the form of a self-image as in the case of Lecky's reformed thumbsucker Having adopted a conception of what we want to be we are constrained to make good in the role we have assumed The specific goals we set for ourselves are almost always subsidiary to our long-range intentions A good parent, a good neighbor, a good citizen, is not good because his specific goals are acceptable, but because his successive goals are ordered to a dependable and socially desirable set of values We now know that juvenile delinquency and adult criminality were sadly misconceived so long as they were regarded as a matter of bad habit-formations For years reformatories have trained habits, but have achieved few reformations Only a radical shift of outlook and intention remakes a criminal, alcoholic or neurotic character

The models we have been following lack the long-range orientation which is the essence of morality Infant and rodent have immediate goals and indulge in anticipatory goal reactions, but have no directive schemata By contrast a child in puberty develops a desire to become a successful and respected man of affairs, and acquires this generalized objective long before he knows what concrete goals he has to work for Thus customarily image and intention seem to antedate and to define goal-reactions The essence of moral behavior is of this sort It presupposes long-range purposes whose directions precede their specifications

When President Roosevelt enunciated the Four Freedoms he was speaking of certain common intentions of the human race An important feature of his historic formulation lies in his assumption that *all* men, in *all* cultures, intend (that is, long for) freedom from want, freedom from fear, freedom of speech and of worship Note how this assumption contrasts with the prevailing creed of modern social science Cultural relativity, really a doctrine of stimulus-expectancy, has laid such a heavy hand upon us that we have overlooked the possibility of universal intentions Yet unless Roosevelt's bold assumption is found justified, we can scarcely hope to find a psychological basis for effective world organization

In all probability Roosevelt's formulation is psychologically not the best that can be made, nor dare we underestimate the incompatibility of nationalistic intentions and rivalries What I am saying is that the psychologists perspective should be equally bold It is up to us to find out whether there are in fact common purposes that might provide ground for international solidarity To do so, social psychologists in all lands might well join in a search, through modern instruments of polling, clinical interviewing, child study, and life-histories, for existent moral bases on which international cooperation can be built

It is conceivable—I think probable—that such research would discover the ruthless pursuit of personal and national power to be a result of the frustration of basically affiliative intentions In clinical practice we know how often the clamorous manifestations of egotism gain the upper hand when men are denied a proper continuation of the originally friendly and symbiotic relationship with family, friends, and neighbors It seems probable that every child in every nation, the world over at a time when he is most plastic, wants security, affection, and an affiliative and comprehending relation to the surrounding world It is conceivable that the same basic intentions exist in most adults, although thwarting and perversion of this relationship have engendered a vast

amount of hatred, emotional instability, and warlike impulse

Basic research would discover why the taboo on tenderness, on nurturant desires, has grown so excessive that the development of cooperative and affiliative behavior outside one's own family is, at least in our culture, generally disapproved It would seek to discover under what conditions the impulse to love and to be loved is turned to the impulse to hate and to invite hatred If it is the child's nature to trust everyone, why is it the nature of national or ethnic groups to distrust nearly everyone? The models we have been following tend to deflect our attention from problems of human affection and the conditions for its development When a bit of human friendliness is discovered —and it can be discovered only accidentally with models now current—it is likely to be labeled "goal inhibited sexuality," and thus tagged, forgotten Up to now the sexual activity of rat and man has received incomparably more attention from psychologists than has the cooperative activity of men and nations.

Besides the study of affection and hatred, the possibilities for peace require research into many other strictly human capacities—among them the use of humor, the function of creeds, the processes of communication For moral development depends on many factors other than root-desires and intentions But every aspect of moral conduct that one can name depends intricately upon the employment of symbols

Signs and Symbols

Perhaps the clearest symptom of the present conceptual confusion in our field is the extent to which we confound symbols with signs, or—if one prefers Morris's terminology—symbols with signals.

We know that all animals, as well as men, respond to signals The principle of expectancy says so, and in this respect is right A signal is something that exists in the physical world, it is an identifiable stimulus But even the most behavioristically inclined theorists cannot, and do not, claim that animals can handle propositional symbols —those self-produced signs *of* signs which are man's prized and troublesome possession An animal, says Thorndike, can "think things," but it cannot "think about things" (18, p. 119) And Yerkes asserts that symbolic processes in chimpanzees are rare and difficult to observe. One may, he says, fairly continue to question their existence, though it may be that signal responses can be regarded in some way as "antecedents of human symbolic processes" (20, p 189). Surveying relevant investigations and opinions, Cassirer concludes.

"In all literature of the subject there does not seem to be a single conclusive proof of the fact that any animal ever made the decisive step from subjective to objective, from affective to propositional, language" (7, p 30)

Cassirer argues, reasonably enough, that the symbolic system creates a wholly new dimension of reality for man Instead of dealing directly with things themselves or with their visible signals, man deals with their ideational surrogates.[6]

"He has so enveloped himself in linguistic forms, in artistic images, in mythi-

[6] Even in human beings we occasionally encounter a sharp break between symbols and signs Some of Goldstein's aphasic patients, for example, seem capable of responding to signs but not to symbols, as in the case of the man who could understand the word-signs "Drink it," when a glass full of water was presented to him, but was unable to go through the symbolic motions of drinking it if the glass was empty (8, p 44)

Without symbols we could not make-believe, dissimulate, or lie, we could not form plans for our future, nor hold those schemata in mind that make possible consistency in moral conduct

cal symbols or religious rites, that he cannot see or know anything except by the interposition of this artifical medium" (7, p 25)

Even so behavioristic a writer as Morris admits that the theory of sign-response as developed by himself carries over with difficulty to the human sphere. These are his words:

" . . non-human beings seldom produce the signs which influence their behavior, while human individuals in their language and post-language symbols characteristically do this and to a surprising degree Here is a basic difference between men and animals, and until behavioral theory develops a semiotic adequate to this difference it will remain what it is today a careful study of animals and a pious hope for a science of the human person" (16, p 198)

In this passage Morris seems to be saying with fine candor that there is a world of difference between signal and symbol; and that even his own careful system of semiotic fails adequately to bridge the gap. Though I have not actually counted the illustrations in his recent book I have the impression that a majority of them refer to animal responses to signals, and that relatively few deal with human responses to symbols In any case it is clear that Morris, like many psychologists, is enamored of the phylogenetic model.

I venture to cite another brilliant and candid passage from his book He writes of the fact that a sign may be *iconic*, that is to say, it may itself resemble the properties of its denotatum. Thus a motion picture is highly iconic, an onomatopoeic word less so; a wholly arbitrary sign not at all iconic He then goes on to make this highly significant remark.

"One of the dangers of the use of models in science, for instance, arises out of the temptation to ascribe to the subject matter of a theory properties of the model illustrating the theory which are not involved in the theory itself" (16, p 23)

From this warning would it not follow that an adequate theory of symbols can hardly be derived from the animal model in which *signals* alone predominate? How can we expect to understand human symbolism in terms of the phylogenetic type when, as Morris himself asserts, we are tempted to over-extend the properties of our type-model and force them to serve in place of the independent theory that we need to develop?

THE MODEL WE NEED

To sum up the designs we have been using in our studies of motivation, of symbol, and hence of the foundations of moral behavior, are not--to borrow Morris's crisp term—sufficiently iconic with our subject-matter Addiction to machines, rats, or infants leads us to overplay those features of human behavior that are peripheral, signal-oriented, or genetic. Correspondingly it causes us to underplay those features that are central, future-oriented, and symbolic.

What sort of a model then do we need? This question opens systematic vistas that lie beyond the scope of this paper. Yet, lest my numerous criticisms indicate a despair that I do not actually feel, I shall mention a few recent signs and portents that signify a newer—and, to my mind—more wholesome outlook.

Most noteworthy is the fact that the war led many psychologists to deal directly with the integrated behavior of GI Joe, of the factory worker, of the civilian. We then learned that the interests of morale, psychotherapy, personnel placement, psychological warfare, could not be pursued successfully by clinging to our threadbare models Our

inadequate root-metaphors went into the ash can for the duration It is because of this conceptual discard, with its resultant wartime success in the promotion of social engineering, that I have presumed at this time to bring into the open a conflict that many, perhaps most of us, have secretly felt Must we now resume the tattered stencils that we so recently abandoned with such good effect?

There are various indicators of improvement in theoretical outlook. I have in mind the new and vital conception of the ego that has come into psychotherapy in recent years (3), the discovery and application of psychological principles involved in bringing the worker into a participant relation with his job (2), the discovery and application of procedures leading to successful administration (14) We discern an accelerated movement toward the development of such theories as can have their acid test here and now not one thousand years hence These theories neither strain the credulity, nor stretch an inappropriate model some distance beyond its logical breaking point

We happily find more emphasis than before on the structuring activities of the person, on the importance of centrally initiated motive patterns, on cognitive dynamisms including ideology, schemata of meaning, frames of reference We find the contemporaneity of motives stressed, as well as the important functions of self-esteem and ego-involvement Though symbols are still confused with signals, we are beginning, through content-analysis and interviewing to study symbols both in their own right, and as the basic ingredients that they are in all complex conduct, including all morally relevant thought and behavior We have learned through improved polls and other methods of inquiry, to ascertain the direction of social purpose as it resides in individual minds From such knowledge it should be possible to fashion a domestic and international social policy that will be sufficiently realistic to succeed

All these and many more signs indicate the growing dependence of modern theories upon a model that is none the less scientific for being humane. As this design for personality and social psychology gradually becomes better tempered to our subject-matter we shall cease borrowing false notes—whether squeaks, squeals, or squalls We shall read the score of human personality more accurately, and for the benefit of the world audience that waits to listen

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PERSONALITY A PROBLEM FOR SCIENCE OR A PROBLEM FOR ART?

Reprinted from *Revista de Psihologie* (Cluj Romania I No 4, 1938 1 15)

Already in the twentieth century three great revolutions have occurred in man's thinking about his own mind These are first, Freudian psychoanalysis, with its discovery of the depth and the emotion in mental life, second, Behaviorism, with its discovery of the accessibility of mind to objective study; and third, Gestalt psychology, with its discovery of the essential orderliness and self-regulation of mind It is not at all unlikely that these new modes of thought will revolutionize our ways of life during the present century, much as the natural and biological sciences revolutionized ways of life during the past century We may well expect them to affect profoundly the morals, manners, and mental health of our generation and of generations to come. Psychology, it is often said, is destined to become *the* science of the twentieth century

Now, one of the most significant happenings in the first part of the twentieth century has been the discovery — to which Freudian, Behavioristic, and Gestalt psychologies have all contributed — that human *personality* is an accessible subject for scientific probing It is this event, above all others, I think, that is likely to have the most practical consequences for education, for ethics, and for mental health.

But before getting into the problem of personality I should like to dwell for a moment upon the somewhat stormy state of psychological science today. It sometimes seems to me that all the four winds of the intellectual heavens had collided in one storm center, competing for mastery, with the outcome as yet unsure

According to the division adopted by the Harvard Tercentenary celebration there are indeed exactly four winds in the intellectual heavens, springing from the four basic provinces of research and learning

the natural sciences
the biological sciences
the social sciences
the humanities

Have you ever thought before that it is in the territory of psychology and *only there*, that all these four intellectual winds collide and run a tempestuous course? I suppose it is natural enough that they should do so, for only by the aid of all the inventions and all the resources of the mind can the creative mind itself be adequately explored

From the *natural sciences* comes the colossal impact of scientific methodology. I suppose that in the entire history of human thought there never was a case where one science has been bullied by another science to compare with the way psychology is bullied by her elder sister science, physics. And I suppose no younger sister ever had so acute an inferiority complex as psychology has in relation to her well-groomed and socially correct elder sister. The desire to emulate the success of physics has led psychology to import at an increasing rate instruments of precision and mathematics into its treatment of mental life Heaven help the psychologist nowadays who doesn't know his amplifiers and electrical circuits It is, of course, particularly in the study of sensation that the physical sciences dominate psychology, though it is also true that their influence is felt throughout the entire structure of psychological science

From the *biological sciences* also come high standards and exacting methods of research, as well as the evolutionary and organismal points of view without which psychology would still be scholastic in character. But the freshening winds of biology have not blown gently and with moderation, they have blown rather with the force of a gale; so forcefully that in many quarters they have threatened to push every vestige of humanism out, leaving psychology with a plague of rats Today it is probably true that more rats are used in the American laboratories of psychology as subjects than men, women, and children combined Some people feel that what psychology really needs is an efficient Pied Piper

It is, then, the impact of the natural and biological sciences upon psychology that account for its obsession to reach the eminence of scientific respectability The methodological advances have indeed been considerable, but the sum-total of the findings from these points of approach have not as yet by any manner of means solved the problems of human personality. Their value lies chiefly in their advancement of sensory and reflex psychology, or as someone has a bit derisively called it "eye-ear-nose-and-throat" psychology

In recent years the third wind has risen likewise to the force of a gale. *Social science* is causing a tornado all its own It refuses to blend amicably with natural and biological science, but claims mind pretty much as its own province for study Anthropologists and sociologists give no quarter. Mind, they insist, takes its form almost wholly in response to cultural demands Language precedes the individual, so too do the religion, the morals, the economic system into which the individual is born. Mind then, is not a matter for instrumental or biological study, but for cultural study A large number of psychologists have been converted, at least partially, to this view, and recently have staged a rebellion within their own ranks, four hundred of them forming a society

to investigate as realistically as possible the fate of mind as it is conditioned and constrained by the gigantic movements of contemporary society.

The last wind that blows in our storm center is gentler and less voracious. Yet its presence is always felt. In spite of all counter currents it is perhaps still the prevailing wind. It is the wind of humanism. After all is said and done, it is philosophy and literature, and not the natural, biological, or social sciences, that have fostered psychology throughout the ages. It is only in comparatively recent years that psychology has detached itself from philosophy and from art to become the storm center that it is. Only five years ago in my own university it was still felt that psychology should not form a department of its own but should remain snuggly sheltered within the historic sanctuary of philosophy.

Now we come to personality. One of the outstanding events in psychology of the present century has been the discovery of personality. Personality, whatever else it may be, is the substantial concrete unit of mental life that exists in forms that are definitely single and individual. Throughout the ages, of course, this phenomenon of personal individuality has been depicted and explored by the humanities. The more aesthetic philosophers and the more philosophical artists have always made it their special province of interest.

Tardily, psychologists have arrived on the scene. One might almost say they are beginning two thousand years too late. The psychologist's work, it might seem, has been done for him, and done most brilliantly. With his scant thirty years of background, the psychologist looks like a conceited intruder. And so he is in the opinion of many literati. Stephan Zweig, for example, in speaking of Proust, Amiel, Flaubert, and other great masters of characterization, says,

> "Writers like these are giants in observation and literature, whereas in psychology the field of personality is worked by lesser men, mere flies, who have the safe anchorage of a frame of science in which to place their petty platitudes and minor heresies."

It is true that the giants of literature make psychologists, who undertake to represent and to explain personality, seem ineffectual and sometimes a bit foolish in comparison. Only a pedant could prefer the dry collections of facts that psychology can [illegible]er regarding an individual mental life to the glorious and unforgettable portraits that the gifted novelist, dramatist, or biographer can give. The literary artist creates his account, the psychologist merely compiles his. In the one case a unity emerges, self consistent even through its subtleties of change. In the other case a ponderous accumulation of discontinuous data piles up.

One recent critic has put the matter crisply. Psychology, whenever it deals with human personality, he remarks, is only saying what literature has always said, and is saying it much less artfully.

Whether this unflattering judgment is entirely correct we shall soon see For the moment it serves at least to call attention to the significant fact that in a sense literature and psychology *are* competitors, they are the two methods *par excellence* for dealing with the personality The methods of literature are those of art, the methods of psychology are those of science Our question is which approach is the more suitable for the study of personality?

Literature has had centuries of headstart, and it has been served by genius of the highest order Psychology is young and has bred as yet few, if any, geniuses in the depiction and explanation of human personality Being youthful, it would be becoming for psychology to learn a few basic truths from literature

To show what it can profitably learn, let us take a concrete example I have chosen one from ancient times in order to show clearly the maturity and ripeness of literary wisdom Twenty-three hundred years ago, Theophrastus, Aristotle's pupil and successor at the Lyceum in Athens, wrote a number of brief characterizations of certain of his Athenian acquaintances Thirty of his sketches have survived

The sketch that I shall select is called "The Coward" Please note its timelessness The coward of today is essentially the same kind of mortal as the coward of antiquity. Please note also the remarkable directness and economy of the portrait No words are wasted It is like a prose sonnet No one could add or subtract a single sentence to its betterment

THE COWARD

"Cowardliness is a shrinking of the soul caused by fear The Coward is this sort of person At sea he thinks cliffs are pirates and directly the sea gets rough inquires anxiously whether all the passengers are initiated,* as he looks up at the sky he asks the steersman if they are half-way and what he thinks of the weather, he tells the person next him that he has had a disturbing dream, he takes off his tunic and gives it to his slave,** and finally begs to be put on shore. On active service when the infantry are going into action, he calls to the men of his deme to come and stand by him and to keep a good look-out — pretending that it is hard to distinguish who is the enemy Then hearing the noise

* Into the mysteries of the Cabeiri

** So that he can swim

of battle and seeing men fall, he tells his comrades that in the hurry he has forgotten his sword, he runs back to his tent and, after getting rid of his slave by sending him out to reconnoitre, hides the sword under his pillow and wastes time in pretending to look for it If he sees a wounded friend carried in, he rushes up, tells him to keep cheerful, holds him under the arms to support him; then he attends him, wipes the blood off and sits down by him to keep the flies away — in short, does everything except fight The trumpets sound the charge and, as he sits in the tent, he murmurs. "Curse you! Won't you let the poor man sleep with your everlasting trumpeting!" Covered with the other man's blood he goes out to meet the returning soldiers and tells them he has saved one of his friends at the risk of his own life, and he brings to the bedside the men of his deme and tribe and explains to each visitor that he carried the wounded man to the tent with his own hands"

There is one feature in this classic sketch that I should like to call particularly to your attention. You will note that Theophrastus selects two situations for recording his observations In one the coward is traveling, in the other he is unwillingly engaged in a battle In the first situation seven typical episodes are depicted. the coward's illusion of seeing the cliffs as pirates, his superstitious fear lest some of the passengers might bring bad luck through having neglected a religious rite, his desire to be at least half-way on the dangerous journey, his consulting expert opinion on the weather, his fear of his own disturbing dreams, his preparations for swimming to safety, and finally his emotional collapse in begging to be put on shore Even more subtle are the seven telltale episodes during battle. In all there are fourteen situations described· all of them for the coward are equivalent, whatever stimulation he is exposed to arouses the same deep, dominant disposition Although his separate acts are quite distinctive, yet each and every one is equivalent in that each is a manifestation of the same dominant cowardly disposition

In short, Theophrastus, more than 2000 years ago, used a method, just now being glimpsed by psychologists, of defining with the aid of equivalent stimulations and equivalent responses the major dispositions of a character.

To state the point yet more broadly· Almost all the literature of character — whether sketch writing, as in the case of Theophrastus, or fiction, drama, or biography — proceeds on the psychological assumption that each character has certain traits peculiar to himself which can be defined through the narrating of typical episodes from life In literature a personality is never regarded, as it sometimes is in psychology, as a sequence of unrelated specific actions Personality is not like a water-

skate, darting hither and yon on the surface of a pond, with its several fugitive excursions having no intrinsic relation to one another Good literature never makes the mistake of confusing the personality of man with that of a water-skate Psychology often does

The first lesson, then, that psychology has to learn from literature is something about the nature of the substantial and enduring dispositions of which personality is composed This is the problem of traits, and by and large, I maintain, it has been handled more successfully through the assumptions of literature than through the assumptions of psychology. More specifically, it seems to me, the concept of the equivalence of stimulation and the equivalence of response, seen so clearly in the ancient sketches of Theophrastus, may serve as a strikingly productive guide for the scientific study of personality — where equivalences may be determined with greater accuracy and greater verifiability than in literature itself Using the resources of the laboratory and controlled observation outside, psychology might be able to establish for the single individual far more exactly than literature can do, the precise range wherein various life-situations are for him equivalent, and the precise range of responses which for him have equivalent significance.

A second major lesson from literature concerns the self-consistency of its products No one ever asked their authors to prove that the characters of Hamlet, Don Quixote, Anna Karenina, Hedda Gabbler, or Babbitt were true and authentic Great characterizations by virtue of their greatness prove themselves. They are plausible, they are even necessary Every act seems to be in some subtle way both a reflection of, and a rounding out of a single, well-knit character This adhesiveness of behavior meets the test known as self-confrontation, one bit of behavior supports another, so that the whole can be comprehended as a self-consistent if intricate unity. Self-confrontation is the only method of validation applied to the work of artists (excepting perhaps to the work of biographers, who indeed have certain requirements for external validation to contend with). But the method of self-confrontation, I think it may rightly be said, is barely beginning to be applied to the productions of psychology.

Once in commenting on a character of Thackeray's, Gilbert K Chesterton remarked, "She drank, but Thackeray didn t know it." Chesterton's quip springs from the demand that all good characterizations possess "systematic relevance" within themselves. Given one set of facts about a personality, other relevant facts should follow. To be sure, a deep and intimate knowledge of a character is required before these necessary inferences can be made One must know just what the most intimate motivational traits in each case are. For this most central,

and therefore most unifying core of any personality, Professor Wertheimer has proposed the concept of the "radix" — a root from which all stems may grow. He illustrates his conception with the case of a school girl who was a zealous scholar, but at the same time addicted to vivid cosmetics. On the surface there certainly seems to be no systematic relevance here. The two lines of conduct seldom go together. But the apparent contradiction is resolved in this case by exploring beneath the surface for the basic root. In this case it turned out that the school girl had deep admiration for (a psychoanalyst might call it a fixation upon) a certain teacher who in addition to being a scholarly woman had a natural vivid complexion. The school girl simply wanted to be like her teacher. The same facts in another case might betoken a basic desire for power, or simply a double-barrelled attempt to capsize the studious boy across the aisle. Whatever the explanation in this case, the point is that with radical understanding it becomes possible to harmonize the apparent inconsistencies in a personality.

Of course, the problem is not always so simple. Not all personalities have basic unity. Conflict, changeability, even the dissociation of personality are common. Much of the *literature* we read exaggerates the consistency of personality, caricatures rather than characters emerge. Oversimplification is found in drama, fiction, and biography. The confrontation seems to come almost too easily. The characters of Dickens are a good example of oversimplification. They never have conflicts within themselves. They are always what they are. They may, and usually do, meet unfriendly forces in the environment, but they themselves are entirely perfect in consistency and devoid of inner conflict.

But if literature often errs through its selectivity in exaggerating the unity of personality, psychology through its lack of interest and restricted techniques generally fails to discover or to explore such consistency as does exist.

The greatest failing of the psychologist at the present time is his inability to prove what he knows to be true. No less than the literary artist he knows that personality is an intricate, well-proportioned, and more or less consistent mental structure — but he can't prove it. He makes no use, as the writer does, of the obvious method of self-confrontation of facts. Instead of emulating the artist in this matter he usually takes safe refuge in the thickets of statistical correlation.

One investigator, thinking to study the virility of his subjects, for a whole population of people, correlates the width of hips and shoulders with interests in sports, another, to find the bases of intelligence, carefully compares the I. Q. in childhood with the ossification of the wrist bones, a third compares phosphorous per body weight with good-naturedness or

with leadership. Investigations such as these, though they are the fashion in research on personality, run their course entirely on a subpersonal level. Devotion to the microscope and to mathematics has led the investigators to shun complex patterned forms of behavior and thought, even though it is only in these complex forms that personality can be said to exist at all. Bullied by the instruments of physics, many psychologists neglect the most delicate recording instrument ever devised for the relating and proper clustering of facts — namely, their own minds.

Psychology, then, needs techniques of self-confrontation, techniques whereby the togetherness of a personality can be determined. Only a few rudimentary attempts in this direction have been made.*

One study employed the English themes of 70 college students. Nine themes were gathered from each student, three in October, three in January, and three in May. The topics for the themes were prescribed and were uniform for all students.

After being typed and divested of all identifying signs, two experimenters attempted to sort these themes carefully so that they might from style alone group all the themes written by the same student. For both experimenters the results were strikingly positive, well above chance.

The point of interest here is the method by which successful matchings were made. Occasionally, to be sure, some striking mechanical feature caught the eye and aided in identifications. Addiction to semicolons would mark the writing of one student, or some other oddity of punctuation or spelling. But most of the identifications were not made on this basis but through a diagnosis of the *personal traits* of the writers. "The investigators found themselves searching for a form-quality of the individual." They felt in each production a reflection of certain complex qualities in the writer himself. Now these qualities were different in each case and difficult for the experimenter to reduce to words.

In spite of the difficulty of expressing these hypotheses of "form-quality" in words, the fact remains that they (and not mechanical features) were ordinarily the basis of judgment, and likewise that the judgments were to a significant degree successful.

It is of interest to note some of the bases upon which this matching proceeded. The productions of one student, for example, would be felt always to reflect "a feeling for atmosphere, a well-balanced sense of humor, a quiet, amused tolerance of social relations and situations."

* The following experiment is described on pp. 491 ff of my book, *Personality: a Psychological Interpretation*, New York: Henry Holt, 1937.

Another showed in all his themes "a positive self-assurance, definite, but neither prejudiced nor opinionated, sense of humor" A third was "constantly bored Looks at life as a monotonous experience in which one follows the easiest course of action " A fourth had a "simple, optimistic attitude toward life and people, simple, direct, declarative sentences "

There is a third major lesson for psychologists to learn from literature, namely how to keep a sustained interest in one individual person for a *long* period of time. It was said of a certain famous English anthropologist that although he wrote about savages, he never actually had seen one He admitted the charge, and added — "and I hope to Heaven I never shall" A great number of psychologists in their professional capacity have never really *seen* an individual, and many of them, I regret to say, hope they never will

Following the lead of the older sciences they assume that the individual must be brushed aside Science, they insist, deals only with general laws The individual is a nuisance What is wanted are uniformities. This tradition has resulted in the creation of a vast, shadowy abstraction in psychology called the generalized-adult-human-mind The human mind, of course, exists in no such form, it exists only in concrete, intensely personal forms. There is no generalized mind The abstraction that the psychologist commits in measuring and explaining a non-existent mind-in-general is an abstraction that no literary writer ever commits The literary writer knows perfectly well that mind exists only in singular and particular forms

Here, of course, we are facing the basic opposition between science and art. Science, it is said, always deals with the general, art always with the particular But if this distinction is true, what are we to do about personality? Personality is never general, it is always particular Must it then be handed over, wholly to the arts? Can psychology do nothing about it? I am sure that very few psychologists would accept this solution But still it seems to me that the dilemma is inexorable. Either we must give up the individual or we must learn from literature to dwell longer upon him, modifying as is necessary our conception of the scope of science so as to accommodate the single case more hospitably than heretofore

You may have remarked to yourself that the psychologists you have known, in spite of their profession, are no better than anyone else in understanding people They are not exceptionally shrewd, nor are they always able to give advice on problems of personality This observation, if you have made it, is certainly sound I should go further, and say

that because of their habits of excessive abstraction and generalization, many psychologists are actually inferior to other people in their comprehension of the *single* lives that confront them

When I say that in the interests of a proper science of personality the psychologist should learn to dwell longer on the single case, it might seem that I am poaching upon the domain of biography, whose precise purpose is to dwell exhaustively upon one life.

There is indeed a remarkably close relationship between literary biography and the psychology of personality, but the two fields are by no means identical The psychologist needs to look at the single case more ardently in his clinical, experimental, and theoretical studies as well as from the point of view of life history Although the psychology of personality is not identical with scientific biography, the psychologist can learn much if he will read and ponder literary biography, and I predict that if he learns his lesson well he may eventually be able to write more revealing and accurate biographies than most of those that literature has produced

In England biography began as hagiography and as a recounting of legendary deeds Neither interest was conducive to objectivity or truthfulness. The term *biography* was first used by Dryden in 1683, and defined by him as "the history of particular men's lives " Reaching a high point in Boswell's *Life of Johnson,* and again in Lockhart's *Life of Scott,* and for a third time in Edmund Gosse's *Father and Son,* English biography has had a career of ups and downs Some biographies are as flat and lifeless as eulogies upon a gravestone, others are sentimental and false

Increasingly, however, biography is becoming rigorous, and objective, and even heartless For this trend psychology has no doubt been largely responsible. Biographies more and more are coming to resemble scientific *autopsies,* performed for the sake of understanding rather than for inspiration or acclaim There are now psychological and psychoanalytic biographies and even medical and endocrinological biographies.

The influence of psychological science is felt in autobiography as well In recent years there have been many experiments in objective self-depiction and self-explanation, with improvement upon the disingenuous confessions of Casanova, Rousseau, or Barbellion Two fascinating examples, illustrating the direct influence of psychology, are the *Experiment in Autobiography* by H G Wells (1935) and *The Locomotive God* by W E Leonard (1927) But for all their enhanced warmth and intimacy, autobiographers suffer one disadvantage compared with biographies. The autobiographer as a rule cannot bear to disparage himself and the reader cannot bear to read his praise of himself. Perhaps in

time writers may learn how to control their powerful impulse to justify their deeds in the telling, and readers may learn correspondingly to be less suspicious of virtue when it is self-disclosed

I have mentioned three lessons that the psychologist may learn from literature for the improvement of his own work The first is the conception held universally in all of literature concerning the nature of traits Each literary artist proceeds on the assumption that his characters have broadly organized inner dispositions that can be identified and defined The method that literature uses in identifying and defining traits — namely, the study of equivalent fields of stimulation and equivalent fields of response, needs urgently to find its way into the psychologist's store of methods The second lesson concerns the test of self-confrontation, which good literature always meets and psychology nearly always avoids meeting. Owing to their neglect of this basic principle of literary validation, psychologists generally fail to find the unity and coherence of the personalities that they study. The third lesson calls for more sustained interest in the single case, through longer periods of time The psychologist should dwell as the biographer does upon one life more exhaustively than he does, no matter if in so doing he sacrifices his impulse to make broad, and usually premature generalizations, about the abstract, nonexistent, average human mind

* * *

In presenting these three advantages of the literary method I have said little about the distinctive merits of psychology In conclusion I ought to add at least a few words in praise of my profession Otherwise you might infer that I am willing and even eager to sell psychology down the river in return for a copy of *Madame Bovary* and a free pass to the Athenaeum

Psychology has a number of potential advantages over literature. Its disciplined character offsets the subjective dogmatism inherent in imaginative writing. Sometimes literature passes the test of self-confrontation of facts too easily For example, in one recent comparative study of biographies of the same person it was found that each version of the life seemed plausible enough, but that in fact only a small percentage of the events and interpretations given in one biography were to be found in the others No one could know which, if any, was the *true* portrait

It is not necessary for good writers to agree in their observations and in their explanations to anything like the same extent that all good psychologists must agree Biographers can give vastly different interpretations of a life without discrediting the literary method, whereas psychology is ridiculed mercilessly when its experts fail to agree with one another.

A psychologist is properly troubled by the arbitrary metaphors of literature. The implication of many metaphors is often grotesquely false, and yet they are seldom challenged. In literature one may find, for example, that the docility of a certain character is explained by the fact that "he had menial blood in his veins", or the fieriness of another character by the fact that "his temperament he shared with all other redheads", or the intellectuality of a third by the "height of his massive brow." A psychologist would be torn limb from limb if he made any such fantastic assumptions concerning cause and effect.

The artist, furthermore, is permitted and encouraged to be entertaining and engaging, to communicate his own images, to express his own biases. His success is measured by the responsiveness of his readers, who often demand nothing more than that they may languidly identify themelves with a character and escape from their immediate worries. The psychologist, on the other hand, is never permitted to entertain his reader. His success is measured by sterner criteria than the reader's applause.

In gathering his material, the writer draws from his casual observations of life, elides his data, and discards troublesome facts at will. The psychologist is held by requirements of fidelity to fact, and to all facts, and he is expected to use controlled and verifiable sources from which to secure his facts. He must prove his inferences step by step. His terminology is standardized and he is deprived almost entirely of the use of seductive metaphor.

These restrictions surrounding the psychologist make for reliability, verifiability, lessened bias, and relative freedom from self-projection into the products of his work.

Psychologists who study personality are, I agree, essentially striving to say what literature has always said, and they are of necessity saying it much less artfully, but so far as they have gone — and it is not very far — they are striving to speak more exactly and, from the point of view of social progress in our century, more helpfully.

The title of this essay, like the titles of many essays, is idly stated. Peronality is not a problem for science or a problem for art exclusively, but for both together. Each approach has its merits, but both are needed for even an approximately complete study of the infinite richness of personality.

If in the interests of good pedagogy I am expected to conclude with one pointed bit of advice, it would be this. If you are a student of psychology, read many, many novels and dramas of character, and read biography. If you are *not* a student of psychology, read these too, but *read psychology as well.*

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